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SYNOPSIS OF THE SPECIES OF AGROMYZID LEAF MINERS DESCRIBED FROM NORTH AMERICA[1]

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Introduction

A total of 206 described North American species are dealt with in this paper. All are separated by illustrated keys and briefly characterized in short descriptions that include the known larval host plants and distributions. Although I am aware of some undescribed species in each of the large genera, I have attempted to define and illustrate each of the previously described species so that new species can be recognized as distinct. The objective of this paper is to lay a firm foundation upon which students of the agromyzid leaf miners may build.

Originally only Nearctic species were to be considered. However, the types of the described West Indian and Central American species are in North American museums except for a few deposited in the British Museum (Natural History). Therefore, it was considered desirable to include the Neotropical area of North America not only because the types were available but because of the number of requests received by U. S. National Museum (USNM) personnel for identifications of leaf miners from the southern extremities of North America.

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The North American species are distributed throughout 15 genera and 11 subgenera. Except for *Xyraeomyia* and possibly *Haplomyza*, all are Holarctic. Several very small genera, mostly monotypic, are not found in North America. These are the Neotropical *Triticomyza* Blanchard and the Palaearctic *Carinagromyza* Sasakawa, *Gymnophytomyza* Hendel, *Ptochomyza* Hering, *Selachops* Wahlberg, and *Xeniomyza* de Meijere. Each genus is redescribed and separated by the use of illustrated keys giving full consideration to the unusual species peculiar to North America. These unusual species are discussed under their respective genera. The similarities and differences between the faunas of North America and the Palaearctic region, the two best collected regions in the world, are also taken up under each genus.

It might be noted here, however, that the northern Neotropical region, poorly collected though it is, has contributed more than its proportionate number of extraordinary species. Among these are the reddish lunule and lower frontal vitta of *Melanagromyza diadema*, the white spot on the halter of *Ophiomyia punctohalterata*, the yellow scutellum of *Phytobia* (*Phytobia*) *picta*, the pictured wing of *P.* (*P.*) *kallima*, the yellow third antennal segment of *P.* (*Calycomyza*) *meridiana*, the distally narrowly yellow femora of *P.* (*C.*) *cassiae*, *P.* (*C.*) *ipomoeae*, and *P.* (*C.*) *lantanae*, the enlarged third antennal segment of males of *Liriomyza commelinae*, and the very large (3.5 to 4 mm. in wing length) South American *L. braziliensis* Frost and *L. ecuadorensis* Frost that have posterolateral setae medially on the midtibia and have larvae that mine the tubers and sometimes the stems of *Solanum tuberosum* Linnaeus.

Two species groups that are all or nearly all Neotropical have representatives in the southern Palaearctic region also. The first of these is the *viridula* group in the genus *Agromyza*. There are four northern Neotropical species and one from eastern United States. There appear to be two Palaearctic species: *Agromyza salicifolii* Collin does not occur north of Israel, and *A. quercus* Sasakawa occurs in Japan. A similar situation is found in *Melanagromyza*. There are five Neotropical representatives in the *pulicaria* group. The two Palaearctic species occur in the southern extremities of that region and one, *M. inaequabilis* Hendel, is not found as far north as Europe while the distribution of *M. pulicaria* Meigen includes Europe.

The morphological characters used in the keys and descriptions were described by Frick (1952). The only change made in that system is the renumbering of the dorsocentral setae. Hendel (1931) numbered from the posterior of the mesonotum forward and Frick (1952) accepted that arrangement. However, in 1953 Frick (1953b) rejected that system and counted from the anterior to the posterior or scutel-

lum. The mesonotum and its setae were later illustrated (Frick, 1956a).

Because complete synonymies have been given previously (Hendel, 1931–1936; Frick, 1952, 1953a, 1956b, 1957a), only North American synonyms for genera, subgenera, and species are listed herein. The most recent paper (Frick, 1957a) gives all but two name changes not previously published so that the correct binomina would be available for this synopsis. The two names not included are *Liriomyza reverberata* (Malloch) and *L. sorosis* (Williston); the changes are discussed in full herein.

The locations of those holotypes not mentioned in the original descriptions or in other papers are given herein. A number of types of Frost's species had been retained in his personal collection and these he recently transferred to the U. S. National Museum.

The references are limited to the original descriptions and to those papers that have illustrations or good redescriptions of previously poorly defined species. The citations are not intended to be complete or to give all nomenclatural changes because those have been previously published (Frick, 1952, 1953a, 1957a). Those papers cited in the text by author and date only are given in full in the list of references cited (p. 445).

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Key to the genera of Agromyzidae found in North America

1. Subcosta developed throughout its length, coalescing with vein R_1 before reaching costa; vein R_1 somewhat broadened at union with the costa (fig. 1) (Agromyzinae) 2
   Subcosta becoming a fold distally and ending in costa separately and basad of vein R_1; R_1 not broadened at its union with the costa (fig. 2) (Phytomyzinae) 5
2. Halter usually all black, rarely with a white spot on knob. 3
   Halter white or yellowish . . . . . **1. Agromyza**
3. Carina between antennae prominent, fusiform or hemispherical, antennae somewhat divergent (fig. 45) 4
   Carina absent, flattened between antennae even though bases widely separated; antennae anteriorly directed. . . . . **2. Melanagromyza**
4. Carina fusiform (fig. 45); orbital setulae erect or reclinate (fig. 47). **3. Ophiomyia**
   Carina hemispherical; orbital setulae proclinate (fig. 55). . . . **4. Tylomyza**
5. Scutellum with four setae (fig. 99). 6
   Scutellum with two setae (fig. 95) . . . . . **6. Cerodontha**
6. Orbital setulae erect or reclinate (fig. 133), sometimes weakly developed, or absent 7
   Orbital setulae proclinate, well developed (fig. 141). 12
7. Wing with costa reaching to end of vein M_{1+2}, or (*Phytobia*) if only to R_{4+5} then ultimate section of M_{3+4} subequal to the penultimate section (fig. 77) 8
   Wing with costa reaching to end of vein R_{4+5}; ultimate section of M_{3+4} at least twice as long as penultimate section when crossvein m-m present (fig. 134) 11
8. Scutellum yellow, at least centrally; vein M_{1+2} ending nearest wing tip (fig. 118) 9
   Scutellum usually dark and concolorous with mesonotum, if yellow vein R_{4+5} ending nearest wing tip (fig. 60). . . . . **5. Phytobia**
9. Genovertical plates narrow, usually slightly but not abruptly raised above the plane of the frontal vitta; if abruptly raised then genovertical plates narrow except dorsad of antennae (fig. 104). 10
   Genovertical plates broad, about one-third the width of the frons and very abruptly raised above the plane of the frontal vittae (fig. 128). **8. Metopomyza**
10. Mesonotum dull black, heavily gray pollinose; two sparse rows of acrostichal setae; crossvein m-m absent; only one upper-orbital seta, reclinate and outwardly directed (fig. 129). . . . . **9. Haplomyza**

Mesonotum shining black and yellow, or if gray pollinose then either four rows of acrostichals, or crossvein m-m present, or two upper-orbital setae present . . . . . **7. Liriomyza**

11. Crossvein m-m, when present, never basal to crossvein r-m; basal section of M_{3+4} present (fig. 134) . . . . . **12. Phytagromyza**
Crossvein m-m basal to crossvein r-m and appearing to be the basal section of vein M_{3+4}, which is absent (fig. 135). . . . . **13. Pseudonapomyza**

12. Costa reaching to the end of vein M_{1+2}; halter with a dark spot on knob. . 13
Costa reaching to the end of vein R_{4+5}; halter white or yellowish. 14

13. Wing with axillary lobe and calypter well developed; mesonotum with acrostichal setae present. . . . . **10. Phytoliriomyza**
Wing with axillary lobe very small and calypter virtually absent; acrostichal setae absent . . . . . **11. Xyraeomyia**

14. Wing with crossvein m-m present . . . . . **14. Napomyza**
Wing with crossvein m-m absent . . . . . **15. Phytomyza**

Systematic Treatment

1. Genus *Agromyza* Fallén

Agromyza Fallén, Specimen entomologicum novam Diptera disponendi methodum exhibens, p. 21 (No. 66), 1810 (Dissertat. Lund.).
Domomyza Rondani, Dipt. Ital. Prodr., vol. 1, p. 121, 1856.

This is a moderately large genus of 22 described species that has the subcosta complete and uniting with vein R_1 at the costa, which is expanded at that point (fig. 1), and the halteres white. The only species that I have seen that has the union of the subcosta and vein R_1 with the costa atypical in some specimens is *Agromyza aristata*. However, most of those examined have the typical costal union (fig. 4). The most diverse types have the subcosta about one-fourth incomplete and R_1 distinctly bent but not expanded near the costa.

There are no diverse species that deviate from the Palaearctic pattern. The great majority of North American species have only two or three well-developed dorsocentrals with none to several small ones. Only four species have the usual arrangement of one strong presutural and three strong postsutural dorsocentrals. In the Palaearctic region there are proportionately more species with the latter arrangement.

As for the species groups, there are representatives in the *rubi* group (couplets 3–5) but none in the *cinerascens* group, which contains three European species. The correlation between shining mesonota and grass mining larvae (*ambigua* group) holds true in North America as in the Palaearctic region. Of the six known North American species (couplet 14), four have larvae that mine the leaves of grasses. The alternative (couplets 7–13) contains eight species that have the mesonotum subshining to dull and larvae that mine in dicotyledons. The host plants are known for four.

One of the more unusual features of the North American fauna is

the five species keying out at couplet 10 (*viridula* group). These are large dark species that may have a metallic sheen to the mesonotum and abdomen. Of the five, four are Neotropical, which seems to account for the higher proportion in North America. There are two species in the Palaearctic region. *A. salicifolii* Collin is not found north of Israel and *A. quercus* Sasakawa occurs in Japan.

Key to the described species of *Agromyza*

1. Mesonotum with two or three well-developed postsutural dorsocentrals plu, none to several small postsuturals; a presutural dorcocentral, when presents small and posterior to the presutural seta 2
   Mesonotum with four strong well-developed dorsocentrals, one presutural and three postsutural, the presutural at least slightly anterior to the presutural seta 19
2. Vein M_{1+2} at or nearest the wing tip; midtibia medially without posterolateral setae 3
   Vein R_{4+5} nearest the wing tip; midtibia medially with one or two posterolateral setae 6
3. Mesonotum dull, grayish pollinose; at least three well-developed postsutural dorsocentrals 4
   Mesonotum shining black; two well-developed postsutural dorsocentrals . . . . . **varifrons**
4. Femora, tibiae, and tarsi yellow; vein M_{1+2} ending only slightly nearer the wing tip than R_{4+5} (figs. 4, 17) 5
   Femora, tibiae, and tarsi dark brown to black, except for foretibia being yellow distally; vein M_{1+2} ending at wing tip . . . . . **rubi**
5. Body with all setae yellowish; dorsal upper-orbital arising from black extending from vertex (fig. 14) . . . . . **pallidiseta**
   Body with all setae black; dorsal upper-orbital arising from yellow (fig. 5). **aristata**
6. Mesonotum and scutellum subshining to dull black, somewhat grayish pollinose, with or without a greenish sheen; larvae mine dicotyledons . . 7
   Mesonotum and scutellum shining black; larvae mine grasses 14
7. Thorax and abdomen yellow or light brown; femora mostly yellow . . . 8
   Thorax and abdomen very dark brown or black, with or without a greenish sheen; femora predominately dark brown 9
8. Third antennal segment and maxillary palpus yellow . . . . . **diversa**
   Third antennal segment and maxillary palpus brown . . . . . **canadensis**
9. Tibiae and tarsi dark brown or black 10
   Tibiae and tarsi yellowish . . . . . **reptans**
10. Mesonotum, scutellum, and abdomen with a greenish sheen 11
    Mesonotum, scutellum, and abdomen without a greenish sheen, subshining or dull brown or black 12
11. Upper-orbital setae subequal in length (fig. 20) . . . . . **viridula**
    Upper-orbital setae unequal in length, the ventral about 1.5 times as long as the dorsal (fig. 10) . . . . . **inaequalis**
12. Calypter with margin and fringe white 13
    Calypter with margin and fringe yellow . . . . . **centrosemae**
13. Anepisternum entirely dark brown or black . . . . . **frosti**
    Anepisternum with a narrow yellow dorsal margin . . . . . **currani**

14. Costa reaching to the end of vein M_{1+2} 15
    Costa reaching to the end of vein R_{4+5} 16
15. Calypter with fringe light brown; frons longer than wide . . . **parvicornis**
    Calypter with fringe white; frons wider than long . . . . . **nigripes**
16. Anterior half of mesonotum with acrostichal setae in six rather regular rows 17
    Anterior half of mesonotum with acrostichals in four rather regular rows. **subnigripes**
17. Gena in height midway between vibrissal and posterior angles about one-third the eye height (fig. 3) 18
    Gena in height midway between vibrissal and posterior angles about one-seventh the eye height (fig. 6) . . . . . **barberi**
18. Third antennal segment dorsally flattened, distally with a sharp angle. **niveipennis**
    Third antennal segment rounded (fig. 3) . . . . . **ambigua**
19. Calypter with margin and fringe brown 20
    Calypter with margin and fringe white or yellow 21
20. Midtibia medially with two posterolateral setae . . . . . **isolata**
    Midtibia medially without posterolateral setae . . . . . **spiraeae**
21. Tibiae and tarsi dark brown . . . . . **rutiliceps**
    Tibiae and tarsi yellowish . . . . . **albitarsis**

Agromyza albitarsis Meigen

Agromyza albitarsis Meigen, Systematische Beschreibung der bekannten europaischen zweiflügeligen Insekten, vol. 6, p. 171, 1830.—Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 100, 1931 (figure of head).

Agromyza cinerascens (Macquart), Melander, Journ. New York Ent. Soc., vol. 21, p. 253, 1913 (3 from Washington: 1 ♂, 1 ♀, Monroe; 1 ♀, Port Gamble).

This Holarctic species belongs with those species having four strong dorsocentral setae, one being presutural. The calypteral fringe is white and the tibiae and tarsi are yellowish. The larvae make blotch mines in the leaves of *Populus* spp. and *Salix lasiandra* Benth. I have studied reared specimens from Washington, California, and Pennsylvania. The species probably is widely distributed.

Agromyza ambigua Fallén

Agromyza ambigua Fallén, Diptera sueciae, vol. 2, No. 37 (Agromyzides), p. 4, 1823.—Hendel, *in* Lindner, Die Fliegen der Palaearktischen Region, fam. 59, p. 103, 1931 (figure of head and wing).

Agromyza kincaidi Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 285, 1913 (figure of wing).—Shewell, Canadian Ent., vol. 85, p. 463, 1953.

The holotype of *A. kincaidi* was compared with two specimens of *A. ambigua* in my collection and with four in the U. S. National Museum, all determined by E. M. Hering. This is a shining black species with three developed dorsocentrals, the costa reaching to the end of vein R_{4+5}, a relatively wide gena, and a rounded third antennal segment (fig. 3). The larvae mine the leaves of some grasses. A Holarctic species, *A. ambigua* is at present known only from Alaska in North America.

Agromyza aristata Malloch

Agromyza aristata Malloch, Canadian Ent., vol. 47, p. 13, 1915.
Agromyza ulmi Frost, Mem. Cornell Univ. Agr. Exp. Sta., vol. 78, p. 54, 1924.—Needham, Frost, and Tothill, Leaf-mining insects, p. 252, 1928 (figure of leaf mine).

A. aristata belongs to the species group in which there are no medial setae on the midtibia and vein M_{1+2} is at or nearest the wing tip (fig. 4). The head (fig. 5) has the arista and the setae somewhat shortened. The larvae mine in the leaves of *Ulmus americana* L. and probably *Celtis occidentalis* Mic. because I have seen a leaf with a mine very similar to that found on elm. Known from Iowa, Illinois, Indiana, Ohio, Pennsylvania, New York, and Virginia.

Agromyza barberi Frick

Agromyza abbreviata Malloch (not Fallén, 1823), Ann. Ent. Soc. Amer., vol. 6, p. 285, 1913 (fig. of wing).
Agromyza barberi Frick, Univ. California Publ. Ent., vol. 8, p. 372, 1952.

This is a shining species with three developed dorsocentrals, the costa ending at vein R_{4+5}, and a very narrow gena (fig. 6). The larvae probably mine the leaves of grasses. Known only from the holotype from New Mexico.

Agromyza canadensis Malloch

Agromyza canadensis Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 299, 1913 (figure of head)—Shewell, Canadian Ent., vol. 85, p. 462, 1953.

This large species (3 mm. in wing length) has the mesonotum dull and bearing about five developed dorsocentrals. It is rather similar to *A. diversa* in that the mesonotum is light brown. However, this species has the third antennal segment and maxillary palpus brown. The head has a very narrow gena (fig. 7). There are only three specimens known, all from Ontario, Canada.

Agromyza centrosemae Frost

Agromyza centrosemae Frost, Ann. Ent. Soc. Amer., vol. 29, p. 301, 1936.

The holotype male is in the U. S. National Museum (No. 62972). It is extremely teneral but the mesonotum lacks a metallic sheen and the calypteral fringe is yellowish. These characteristics separate this species from *A. frosti* and *A. currani*. Known only from the holotype which was reared from *Centrosema pubescens* Benth. in the Panama Canal Zone.

Agromyza currani Frost

Agromyza currani Frost, Ann. Ent. Soc. Amer., vol. 29, p. 305, 1936.

The female holotype is in the American Museum of Natural History and there is a male paratype in the S. W. Frost collection. The head

is high and narrow and the arista is plumose (fig. 8). This species is rather distinctive in having the anepisternum and tergites bordered with yellow and the mesonotum heavily dull gray pollinose. The two known specimens are from Barro Colorado Island, Panama Canal Zone.

Agromyza diversa Johnson

Agromyza diversa Johnson, Occ. Pap. Boston Soc. Nat. Hist., vol. 5, p. 26, 1922.—Shewell, Canadian Ent., vol. 85, p. 462, 1953.

This species belongs to *Agromyza* sens. str. even though the body, including the scutellum, is predominately yellow. *A. diversa* differs from the very similar *A. ferruginosa* van der Wulp of Europe in having the head mostly brown. I have seen specimens from Iowa, Illinois, Massachusetts, Vermont, and Ontario.

Agromyza frosti Frick

Agromyza schmidti Frost (not Aldrich, 1929), Ann. Ent. Soc. Amer., vol. 29, p. 302, 1936.

Agromyza frosti Frick, Univ. California Publ. Ent., vol. 8, p. 373, 1952.

The male holotype is in the U. S. National Museum (No. 62966). There are three paratypes in the S. W. Frost collection. The head has the antenna placed well below the middle of the head and the eye is ovoid (fig. 9). This is a species of moderate size (2 mm. in wing length) that has two developed dorsocentrals, the mesonotum subshining and without metallic sheen, and the anepisternum entirely dark. The type series is from La Caja, Costa Rica, and was reared from the stems of an unidentified plant.

Agromyza inaequalis Malloch

Agromyza inaequalis Malloch, Proc. Ent. Soc. Washington, vol. 16, p. 89, 1914 (figs. of head and wing).

Agromyza iridescens Frost, Ann. Ent. Soc. Amer., vol. 29, p. 303, 1936.

This species has the upper-orbital setae unequal in length, the ventral being the longer and stronger (fig. 10), and a bright green sheen to the mesonotum and abdomen. The larvae make blotch mines in the leaves of *Vigna repens* Baker, *Phaseolus vulgaris* L., and *P. limensis* Macfad. I have seen specimens from Puerto Rico, Cuba, Panama Canal Zone, and Venezuela.

Agromyza isolata Malloch

Agromyza isolata Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 306, 1913.

This species belongs with those species having four developed dorsocentrals, one being presutural. The calypter has the fringe brown and there are two medial setae on the midtibia. This last character and the high, narrow eye (fig. 11) serve to separate *A. isolata* from

A. spiraeae. In addition to the type female from California there is a male in the U. S. National Museum that was collected in the District of Columbia.

Agromyza nigripes Meigen

Agromyza nigripes Meigen, Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten, vol. 6, p. 170, 1830.—Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 137, 1931 (figures of head and wing).

Agromyza dubitata Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 311, 1913.

A relatively common Holarctic species, *A. nigripes* is rather distinctive in having the frons wider than long and the third antennal segment subangulate (fig. 12). The mesonotum is shining black and bears three or four developed postsutural dorsocentrals. The larvae are grass miners and a series in the Illinois Natural History Survey collection were reared from *Triticum aestivum* L. at Wooster, Ohio. The species is known from Iowa, Illinois, Michigan, Ohio, New York, Massachusetts, Ontario, and Quebec.

Agromyza niveipennis Zetterstedt

Agromyza niveipennis Zetterstedt, Diptera Scandinaviae, vol. 7, p. 2741, 1848.—Hendel, *in* Lindner, Die Fleigen der palaearktischen Region, fam. 59, p. 139, 1931 (figures of head and wing).

Agromyza cinerascens (Macquart), Melander, Journ. New York Ent. Soc., vol. 21, p. 253, 1913 (1 ♂, Oroville, Wash.).

This is a rather distinctive, shining black species with the third antennal segment angulate distally, the head in profile subtriangular, and six rows of acrostichals. It has not been reported previously from North America. I have reared it from leaf mines on the following grasses in central Washington: *Secale cereale* L., *Hordeum jubatum* L., *Triticum aestivum* L., and *Agropyron repens* L. There are other specimens from Utah and Kansas.

Agromyza pallidiseta Malloch

Agromyza pallidiseta Malloch, Canadian Ent., vol. 56, p. 192, 1924.

This species is closely related to *A. aristata*, but has all body setae yellowish and the genovertical plates partially darkened (fig. 13). The frons is about as wide as long (fig. 14). Known only from the holotype female in the U. S. National Museum (64299), collected at Rock Creek Park, Washington, D. C.

Agromyza parvicornis Loew

Agromyza parvicornis Loew, Berliner Ent. Zeitschr., vol. 13, p. 49, 1869 (Centuria VIII, No. 92).—Melander (part), Journ. New York Ent. Soc., vol. 21, p. 254, 1913 (excl. 1 ♀, Wisconsin).—Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 312, 1913 (figures of head and wing).—Phillips, Journ. Agr. Res., vol. 2, p. 15, 1915 (figures of leaf mines).

A. parvicornis has the mesonotum shining black and bearing two developed dorsocentrals. The costa reaches to the end of vein M_{1+2} and the calypteral fringe is brown. The larvae mine the leaves of *Zea mays* L. It is a widespread and well known species and I have seen specimens from most of the States in the United States and from Ontario.

Agromyza reptans Fallén

Agromyza reptans Fallén, Diptera sueciae, vol. 2, No. 37 (Agromyzides), p. 3, 1823.—Melander (part), Journ. New York Ent. Soc., vol. 21, p. 253, 1913 (1 ♂, Seattle, Wash.).—Hendel, *in* Lindner, Die Fleigen der palaearktischen Region, fam. 59, p. 144, 1931 (figures of head and wing).

This is a large species (3 to 4 mm. in wing length) that has the mesonotum subshining black and bearing four postsutural dorsocentrals. The tibiae and tarsi are yellowish. *A. reptans* is a common species in Europe, but I have seen no other North American specimens than Melander's and a long series that I reared from blotch mines in the leaves of *Urtica californica* Greene in California.

Agromyza rubi Brischke

Agromyza rubi Brischke, Schrift. Naturf. Ges. Danzig, vol. 5, p. 250, 1881.—Hering, Tijdschr. Ent., vol. 97, p. 118, 1954 (figures of larval characters).

Agromyza sulfuriceps Strobl, Mitt. Naturw. Ver. Steiermark, vol. 34, p. 270, 1898.—Melander, Journ. New York Ent. Soc., vol. 21, p. 225, 1913.—Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 152, 1931 (figures of head and wing).

This rather distinctive Holarctic species belongs to the group with vein M_{1+2} at or nearest the wing tip and with no medial midtibial setae. If differs from *A. varifrons* in having the mesonotum dull gray pollinose and from *A. pallidiseta* and *A. aristata* in having the femora, tibiae, and tarsi dark and vein M_{1+2} ending at the wing tip. The larvae mine the leaves of species of *Rubus*, *Potentilla*, and *Sanguisorba* in Europe. I have seen swept specimens from Washington, Idaho, and California.

Agromyza rutiliceps Melander

Agromyza rutiliceps Melander, Journ. New York Ent. Soc., vol. 21, p. 261, 1913.

The holotype male is in the collection of A. L. Melander. Its condition is poor so no illustrations were prepared from it. *A. rutiliceps* belongs with those species having four developed dorsocentrals, one being presutural. The calypteral margin and fringe are yellow and the tibiae and tarsi are dark. The type from Montana is the only specimen of this species that I have seen.

Agromyza spiraeae Kaltenbach

Agromyza spiraeae Kaltenbach, Verh. Naturh. Ver. Preuss. Rheinlande Westfalens, vol. 24, p. 104, 1867.—Malloch, Diptera of Patagonia and South Chile, pt. 6, fasc. 5, p. 477, 1934.—Hering, Tijdschr. Ent., vol. 97, p. 121, 1954 (figures of larval characters).

Agromyza fragariae Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 307, 1913 (figure of wing).—Frost, Mem. Cornell Univ. Exp. Sta., vol. 78, p. 43, 1924 (figure of leaf mine on *Rubus*).

Agromyza sanguisorbae Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 149, 1931 (figure of wing).

Malloch's holotype was compared with five specimens (one in the U. S. National Museum) sent by E. M. Hering. Hering restricted the concept of *A. spiraeae* to those specimens the larvae of which mine the leaves of the Rosoideae or tribe Roseae. This group includes the genera *Rubus*, *Fragaria*, and *Rosa*, but not *Spiraea*. *A. spiraeae* belongs with those species having four developed dorsocentrals, one being presutural. The margin and fringe of the calypter are brown, and this species may be separated from *A. isolata* by the lack of medial setae on the midtibia and the eye being more subcircular (fig. 15). *A. spiraeae* has been reared from serpentine mines in the leaves of species of *Fragaria* and *Rubus* in California, New York, New Jersey, and Pennsylvania.

Agromyza subnigripes Malloch

Agromyza subnigripes Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 334, 1913.

Agromyza aprilina Malloch, Bull. Illinois Nat. Hist. Surv., vol. 11, p. 359, 1915 (figure of head).

The adults are quite distinctive in the shape of the head and the angulate third antennal segment (fig. 16). The shining mesonotum bears five developed dorsocentrals and only four rows of acrostichals. The larval host plants are unknown for this species, but are probably in the Gramineae. I have seen specimens from Iowa, Illinois, Indiana, New Hampshire, and from Manitoba.

Agromyza varifrons Coquillett

Agromyza varifrons Coquillet, Journ. New York Ent. Soc., vol. 10, p. 189, 1902.

This species is very similar to *A. trebinjensis* Strobl, 1900. It belongs to the group with M_{1+2} at or nearest the wing tip (fig. 17) and without midtibial setae. The head has the genovertical plates darkened nearly to the dorsal lower-orbital (fig. 18) and the gena relatively narrow (fig. 19). The mesonotum is shining black and bears two developed dorsocentrals. These latter two characters separate *A. varifrons* from *A. aristata*, *A. pallidiseta*, and *A. rubi*. No larval host plants are known and the species is not common. I have studied only five specimens, from Iowa, Illinois, District of Columbia, and Pennsylvania.

Agromyza viridula Coquillett

Agromyza viridula Coquillett, Journ. New York Ent. Soc., vol. 10, p. 190, 1902.—Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 313, 1913.

As far as I know, this is the only species found in the United States with a greenish sheen to the mesonotum, scutellum, and abdomen. The mesonotum is subshining and bears two developed dorsocentrals and one small dorsocentral. The head is shaped as in the illustration (fig. 20). The larvae form blotch mines in the leaves of red oak (*Quercus* sp.). *Agromyza quercus* Sasakawa, 1954, is very closely related and the larvae mine the leaves of *Quercus glauca* Thunb. in Japan. The Japanese species differs in having a dark brown margin and fringe to the calypter. I have seen specimens from Georgia in the south to Massachusetts in the north. The specimens reared from red oak were from Indiana. Probably widespread over the eastern half of the United States. The Puerto Rican specimens doubtfully referred to this species by Malloch are all in very poor condition. I can find no references to red oaks occurring in the West Indies so these specimens are no doubt of another species.

2. Genus *Melanagromyza* Hendel

Melanagromyza Hendel, Arch. Naturg., Abt. A., vol. 84, p. 126, 1920.
Limnoagromyza Malloch, Bull. Brooklyn Ent. Soc., vol. 15, p. 147, 1920.

In North America this genus contains 25 described species. The halteres are black but there is no carina between the antennae as occurs in *Ophiomyia* (fig. 45) and *Tylomyza* spp., even though the antennae may be widely separated. The orbital setulae are either inclined in several directions or are all reclinate as in the genera *Agromyza* and *Ophiomyia.*

There are several unusual features not found in the Palaearctic fauna. The first is the reddish lunule and ventral half of the frontal vitta of *Melanagromyza diadema.* The frons is black in all other species. *M. dianthereae* has the only sexual dimorphism in the family of which I am aware. The third segment of the male antenna is much more setulose (fig. 27) than that of the female (fig. 28). None of the North American species has elongate mouthparts as do two in Europe that belong to what could be called the *longilingua* group.

If one were to continue the designation of species groups as Hendel (1931) did for the genus *Agromyza,* two *Melanagromyza* species groups not represented in Europe are known here. The first, the *burgessi* group (couplet 3), has nearly all orbital setulae erect to reclinate except for a few anterior ones (fig. 24). *M. virens* is the sole representative of its group (couplet 4). The orbital setulae are very irregular and are inclined in three directions (fig. 42). The *aeneiventris*

group (couplet 5) contains *M. angelicae* and *M. tamia*, *M. aeneiventris* sens. str. not occurring in North America. Hering and others in Europe have recently restricted the name *aeneiventris* Fallén to the species with dark calypteral margin and fringe, the larvae of which mine the stems of *Urtica* spp. I have not seen this species in North America and Melander's specimens have the calypteral fringe white. *M. lappae* (Loew) must be dropped from the North American list for the reasons stated under *M. angelicae* (Frost). The *cunctata* group is missing in North America. This group has the calypteral margin and fringe dark and the orbital setulae irregular with the posteriormost proclinate.

The next three groups are interesting when compared to the Palaearctic fauna. The *cunctans* group (couplet 7) has all orbital setulae reclinate and the calypteral margin and fringe white. North America has nine species, of which four are Neotropical, in contrast to Europe's two with one extending into North Africa. The next group (couplet 16) may be called the *pulicaria* group. Here the calypteral margin and fringe are brown or black and the genovertical plates do not extend beyond the eye margin (fig. 33). North America has five Neotropical representatives while there are two in the southern Palaearctic region, one extending into Europe. *M. pulicaria* is deleted from the North American list because Melander's specimens of *morionella* obtained from Strobl belong to the genus *Ophiomyia*.

The last group (couplet 20) may be named *schineri*, for the oldest described species. The calypteral margin and fringe are dark and the genovertical plates extend beyond the eye margin (fig. 38). There are nine known species from central and northern Europe and six Nearctic species. The biologies are known for seven of these species and the larvae of all but one form galls on the twigs of such woody plants as *Cytissus*, *Salix*, *Populus*, and *Tilia* spp. The larvae of the other species, *M. simplex*, mine the stems of *Asparagus* sp.

Key to the described species of *Melanagromyza*

1. Orbital setulae either all reclinate or reclinate with a few anterior ones proclinate (fig. 24) 2
   Orbital setulae either mostly proclinate (fig. 22), or irregular with the posterior setulae erect (fig. 42) 4
2. Orbital setulae with a few anterior ones proclinate, all others erect to reclinate (fig. 24) 3
   Orbital setulae all reclinate (fig. 21) 6
3. Calypter with margin and fringe white . . . . . **dianthereae**
   Calypter with margin and fringe brown . . . . . **burgessi**
4. Orbital setulae proclinate, except for a few that are erect adjacent to the eye margin (fig. 22) 5
   Orbital setulae irregular—proclinate, erect, and reclinate, posteriormost erect (fig. 42) . . . . . **virens**

5. Costa reaching to the end of vein M_{1+2}; mesonotum without a green sheen and bearing two dorsocentrals . . . . . **angelicae**
   Costa reaching to the end of R_{4+5}; mesonotum with a green sheen and bearing three dorsocentrals . . . . . **tamia**
6. Calypter with margin and fringe white or yellowish 7
   Calypter with margin and fringe dark brown 15
7. Mesonotum and abdomen with a bronzy or greenish metallic sheen . . . 8
   Mesonotum and abdomen without a metallic sheen 12
8. Foretibia medially without a strong posterolateral seta 9
   Foretibia medially with a strong posterolateral seta . . . . . **caerulea**
9. Mesonotum and abdomen with both bronzy and greenish sheen; crossvein m-m more than its length from r-m 10
   Mesonotum and abdomen with greenish sheen only; m-m not more than its length from r-m 11
10. Eye setulose, especially on dorsal half; subcranial margin rounded from vibrissa to posterior angle (fig. 23) . . . . . **approximata**
    Eye bare; subcranial margin straight from vibrissa to posterior angle (fig. 21). **aldrichi**
11. Lunule very high, about as high above antennal bases as frontal vitta is long; frontal triangle reaching lunule . . . . . **viridis**
    Lunule lower, about one-half as high as frontal vitta is long; frontal triangle shorter, reaching to two-thirds of the distance to lunule . . . . **gibsoni**
12. Costa reaching to the end of vein M_{1+2} 13
    Costa reaching to the end of vein M_{4+5} . . . . . **winnemanae**
13. Head with three lower-orbital setae (figs. 35 and 39) 14
    Head with two lower-orbital setae (fig. 32) . . . . . **mallochi**
14. Vein M_{3+4} with penultimate section subequal to the ultimate . . . **riparella**
    Vein M_{3+4} with penultimate section about twice as long as the ultimate. **subvirens**
15. Head, viewed in profile, with genovertical plates not extending beyond eye margin (fig. 31) 16
    Head, viewed in profile, with genovertical plates extending beyond eye margin (figs. 36 and 38) 20
16. Mesonotum and abdomen without a metallic green sheen 17
    Mesonotum and abdomen with a metallic green sheen . . . . . **minima**
17. Lunule and ventral half of frontal vitta black to very dark brown 18
    Lunule and ventral half of frontal vitta reddish . . . . . **diadema**
18. Midtibia medially with at least one posterolateral seta 19
    Midtibia medially without a posterolateral seta . . . . . **crotonis**
19. Foretibia medially without a posterolateral seta; midtibia medially with three posterolateral setae . . . . . **longiseta**
    Foretibia medially with a posterolateral seta; midtibia medially with one posterolateral seta . . . . . **orbitalis**
20. Costa reaching to or slightly beyond the end of R_{4+5} 21
    Costa reaching to the end of M_{1+2} 23
21. Mesonotum with two strong dorsocentrals 22
    Mesonotum with three strong dorsocentrals . . . . . **salicis**
22. Genovertical plates dull; anterior half of mesonotum with acrostichal setae in six to eight rows . . . . . **similata**
    Genovertical plates shining; anterior half of mesonotum with acrostichal setae in eight to ten rows . . . . . **simplex**
23. Head with two or three lower-orbital setae 24
    Head with four or five lower-orbital setae (fig. 37) . . . . . **setifrons**

24. Crossvein m-m about two-thirds of its length from r-m; gena buccate (fig. 41). **tiliae**

Crossvein m-m about its own length from r-m; gena not buccate, sloping posteroventrally from eye margin . . . . . **schineri**

Melanagromyza aldrichi Frick

Agromyza tibialis Frost (not Fallén, 1823), Ann. Ent. Soc. Amer., vol. 29, p. 312, 1936.

Melanagromyza aldrichi Frick, Univ. California Publ. Ent., vol. 8, p. 377, 1952.

The holotype male is in the U. S. National Museum (No. 62970). This large species has the eye nearly as large as the head (fig. 21), both a bronzy and greenish sheen to the mesonotum and abdomen, and a wing length of 2.5 to 3 mm. The setulae on the arista vary in length from one to two times the basal diameter of the arista. Larval host plants are unknown. I have studied 14 specimens in S. W. Frost's collection from Panama, Panama Canal Zone, and Guatemala. The species appears to be common in Central America.

Melanagromyza angelicae (Frost)

Agromyza lappae (Loew), Hendel (part), *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 167, 1931 (figures of head and wing).

Agromyza pseudocunctans (Strobl), Melander (part), Journ. New York Ent. Soc., vol. 21, p. 251, 1913 (1 ♂, Pullman, Wash.; 1 ♀, Almota, Wash.).

Agromyza angelicae Frost, Ent. News, vol. 45, p. 40, 1934.

European workers—K. A. Spencer in England and E. M. Hering in Berlin—have separated the *Angelica*-mining species from the true *M. lappae*, the larvae of which are found only on *Arctium lappa* L. I compared specimens from these two workers with the holotype of *M. angelicae* and found them to be the same. *M. angelicae* is most closely related to *M. tamia* in having the orbital setulae prochinate, except for a few that are erect adjacent to the eye margin (fig. 22) but lacking a green sheen to the mesonotum. The larvae of *M. angelicae* mine the stems of *Angelica atropurpurea* L. in New York and *A. silvestris* L. in England and Germany. Melander's specimens must belong to this species and not to *M. lappae* because Piper and Beattie (1914) list two species of *Angelica*, *lyalii* Wats. and *canbyi* C. & R., from eastern Washington and do not mention *Arctium lappa* L.

Melanagromyza approximata (Frost)

Agromyza approximata Frost, Ann. Ent. Soc. Amer., vol. 29, p. 316, 1936.

The holotype male is in the U. S. National Museum (No. 62969). There is a paratype female in the collection of S. W. Frost that seems to be of the same species. Closely related to *M. aldrichi*, this species is smaller (2.3 mm. in wing length) and has a deeper gena and a

rounded subcranial margin (fig. 23). The holotype is from Guatemala and the paratype is from the Panama Canal Zone.

***Melanagromyza burgessi* (Malloch)**

Agromyza burgessi Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 323, 1913 (figure of head).
Melanagromyza burgessi (Malloch), Frick, Canadian Ent., vol. 85, p. 69, 1953.

This is a large species with a wing length of 3 mm. The orbital setulae are erect to reclinate except for a few anterior ones that are proclinate (figs. 24 and 25). The only other species with such an arrangement is *M. dianthereae*. The latter has the margin and fringe of the calypter white. No larval host plants are known. The species has a wide range and there are specimens from Colorado, Kansas, North Dakota, Michigan, Illinois, Indiana, New York, and Massachusetts.

***Melanagromyza caerulea* (Malloch)**

Agromyza caerulea Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 322, 1913 (figure of wing).—Bailey and Plank, Journ. Econ. Ent., vol. 33, p. 704, 1940.
Agromyza plumiseta Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 324, 1913.

This is the only North American species known to me that has a green sheen to the mesonotum and abdomen and a strong seta medially on the foretibia. *M. orbitalis* has a foretibial seta but lacks the green sheen and has the calypteral fringe black. The head of *M. caerulea* is relatively high and narrow (fig. 26). The larvae feed in the seeds of several species of *Ipomoea*, including *I. batatas* Poir. The species is known from the Gulf coast of Texas and from Mexico, Puerto Rico, and Jamaica.

***Melanagromyza crotonis* (Frost)**

Agromyza crotonis Frost, Ann. Ent. Soc. Amer., vol. 29, p. 313, 1936.

The holotype male is in the U. S. National Museum (No. 62975). There are only three specimens (two headless) of this species, all from Barro Colorado Island, Panama Canal Zone. The larvae mine the leaves of *Croton billbergianus* Muell. This is a small species (1.3 mm. in wing length) and there is no medial seta on the midtibia. The 16 specimens reared from leaf mines on *Clitoria* sp. are of a difierent species.

***Melanagromyza diadema* (Melander)**

Agromyza diadema Melander, Journ. New York Ent. Soc., vol. 21, p. 259, 1913.

This unique species is known from a single female from Haiti in the A. L. Melander collection. The lunule and lower half of the frontal vitta are reddish in contrast to the black or brown in all other species of *Melanagromyza*.

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***Melanagromyza dianthereae* (Malloch)**

Limnoagromyza dianthereae Malloch, Bull. Brooklyn Ent. Soc., vol. 15, p. 147, 1920.

Melanagromyza dianthereae (Malloch), Frick, Univ. California Publ. Ent., vol. 8, p. 378, 1952.

This is an extraordinarily large species with wing lengths of 3 to 3.75 mm. There is a sexual difference in the third antennal segment, that of the male being more heavily setulose (fig. 27) than that of the female (fig. 28). The orbital setulae are inclined (fig. 29) as they are in *M. burgessi* (fig. 24). The larvae mine the stems of *Justicia* (=*Dianthera*) *americana* (L.) Vahl. Known only from Illinois and Indiana.

***Melangromyza gibsoni* (Malloch)**

Agromyza gibsoni Malloch, Proc. U. S. Nat. Mus., vol. 49, p. 106, 1915 (figure of head, wing, and puparial characters).

The mesonotum and abdomen have a greenish sheen and crossvein m-m is not more than its length from r-m, and usually closer. The head has the genovertical plates slightly extending beyond the eye margin and the four orbital setae are about equidistant from one another (fig. 30). The larvae mine the stems of *Medicago sativa* L. in the western United States. I have identified specimens from California, Arizona, western Texas, and Colorado.

***Melanagromyza longiseta* (Malloch)**

Agromyza longiseta Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 326, 1913 (figure of head).—Shewell, Canadian Ent., vol. 85, p. 468, 1953.

This species belongs to *Melanagromyza* sens. str. because of the single vibrissa and the approximate antennal bases, even though the head (fig. 31) has a distinctive profile. There is only one known specimen, the holotype female from Frontero, Tabasco, Mexico.

***Melanagromyza mallochi* (Hendel)**

Agromyza eupatoriae Malloch (not Kaltenbach, 1874), Proc. U. S. Nat. Mus., vol. 49, p. 107, 1915.

Agromyza mallochi Hendel, Konowia, vol. 2, p. 145, 1923.

M. mallochi belongs to the group with white calypteral fringe and no metallic sheen. The head is relatively high and narrow and bears only two lower-orbital setae (fig. 32). The larvae mine in *Eupatorium odoratum* L. in Puerto Rico.

***Melenagromyza minima* (Malloch)**

Agromyza minima Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 328, 1913.

Agromyza longicauda Curran (part), Scientific survey of Porto Rico and the Virgin Islands, vol. 11, pt. 1, p. 65, 1928 (allotype ♀, Virgin Islands).

Agromyza longiseta (Malloch), Frost, Ann. Ent. Soc. Amer., vol. 29, p. 318, 1936.

A small species (1.5 to 2 mm. in wing length) without unusual features on the head (fig. 33), *M. minima* is characterized by the extremely long ovipositor (two to three times the length of the sixth tergite), dark brown calypteral fringe, and a metallic green sheen. I have seen specimens from Trinidad, Puerto Rico, Virgin Islands, Panama Canal Zone, and Guatemala. Larval host plants remain unknown.

***Melanagromyza orbitalis* (Frost)**

Agromyza orbitalis Frost, Ann. Ent. Soc. Amer., vol. 29, p. 314, 1936.

The holotype male from Barro Colorado Island, Panama Canal Zone, is in the American Museum of Natural History. It is the only specimen of this species. The head has several of the setae broken (fig. 34). There is a medial seta on the foretibia but *M. orbitalis* has the calypteral fringe black and lacks the metallic sheen found in *M. caerulea*.

***Melanagromyza riparella* (Hendel)**

Agromyza riparia Malloch (*not* van der Wulp, 1871), Proc. U. S. Nat. Mus., vol. 49, p. 105, 1915 (figures of head and wing).
Agromyza riparella Hendel, Konowia, vol. 2, p. 145, 1923.

This species belongs to the group with all orbital setulae reclinate, white calypteral fringe, and body without metallic sheen. It is characterized by having three lower-orbital setae, a relatively wide gena (fig. 35), and vein M_{3+4} with the two sections subequal in length. I have seen 30 specimens, all from Illinois.

***Melanagromyza salicis* (Malloch)**

Agromyza salicis Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 314, 1913 (figure of wing).

The holotype is now wingless but Malloch's figure shows the venation. *M. salicis* is unusual in having very prominent genovertical plates (fig. 36) and three strong dorsocentral setae. The larvae form galls on the twigs of willow (*Salix* spp.). At present the species is known from Illinois, Ohio, New York, and Massachusetts.

***Melanagromyza schineri* (Giraud)**

Agromyza schineri Giraud, Verh. Zool.-Bot. Ges. Wien, vol. 11, p. 484, 1861.
Melanagromyza schineri (Giraud), Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 174, 1931 (figures of head and wing).

This species has prominent genovertical plates and a relatively small gena that slopes posteroventrally from the eye margin, while the gena of *M. tiliae* is buccate (fig. 41). Crossvein m-m is about its own length from r-m while it is only about two-thirds of its length from r-m in *M. tiliae*. The larvae form galls on the twigs of *Populus* spp. *Salix*

spp. are also attacked in Europe. The specimens that I have seen are from such widely scattered localities as Washington, Colorado, Massachusetts, and Ontario.

***Melanagromyza setifrons* (Melander)**

Agromyza setifrons Melander, Journ. New York Ent. Soc., vol. 21, p. 260, 1913.

In addition to the holotype from Troy, Idaho, Melander has a second male from Avon, Idaho. Distinctive in having six or seven orbital setae and an eye that is high and narrow (fig. 37).

***Melanagromyza similata* (Malloch)**

Agromyza similata Malloch, Canadian Ent., vol. 50, p. 178, 1918.

The holotype male from Dubois, Ill., is the only specimen of this species. *M. similata* is similar to *M. simplex* in having the costa end at vein R_{4+5} and with two pairs of dorsocentral setae. However, in this species the genovertical plates are dull and there are only six to eight rows of acrostichal setae. The dorsal upper-orbital is situated very close to the vertex (fig. 38).

***Melanagromyza simplex* (Loew)**

Agromyza simplex Loew, Berliner Ent. Zeitschr., vol. 13, p. 46, 1869 (Centuria VIII, No. 84).

Melanagromyza simplex (Loew), Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 176, 1931 (figures of head and wing).

M. simplex can be distinguished from *M. similata* by the shining genovertical plates and the eight to ten rows of acrostichal setae of the former species. The larvae mine under the epidermis of asparagus stems close to the ground level. Found wherever *Asparagus officinalis* L. is grown, it has been reported from many States.

***Melanagromyza subvirens* (Malloch)**

Agromyza subvirens Malloch, Proc. U. S. Nat. Mus., vol. 49, p. 105, 1915 (figures of head and wing).

This species is close to *M. riparella* in having three lower-orbital setae (fig. 39), but it differs in having the penultimate section of M_{3+4} about twice as long as the ultimate. Also, crossvein m-m usually is at an obtuse angle to the penultimate section of M_{1+2} instead of being perpendicular. I have identified specimens from Iowa, Illinois, Virginia, and Pennsylvania.

***Melanagromyza tamia* (Melander)**

Domomyza tamia Melander, Journ. New York Ent. Soc., vol. 21, p. 258, 1913.

M. tamia is known from six specimens from Washington. It is close to *M. angelicae* in the arrangement of the orbital setulae (fig. 40)

but differs widely in having a green sheen, three dorsocentral setae, and the costa ending at vein R_{4+5}.

***Melanagromyza tiliae* (Couden)**

Agromyza tiliae Couden, Proc. Ent. Soc. Washington, vol. 9, p. 35, 1908 (figures of adult, puparium, and twig galls).—Malloch, Bull. Illinois Nat. Hist. Surv., vol. 11, p. 351, 1915 (figures of puparial characters).

Many of the type series are teneral but one has the head in good condition. The gena is buccate, rounded ventrally, and is high, being about one-fourth the eye height (fig. 41). *M. tiliae* differs from *M. schineri* in having the large gena and in crossvein m-m being about two-thirds of its length from crossvein r-m. The larvae make galls in twigs of *Tilia americana* L. The species has been positively identified only from Missouri and Illinois.

***Melanagromyza virens* (Loew)**

Agromyza virens Loew, Berliner Ent. Zeitschr., vol. 13, p. 46, 1869 (Centuria VIII, No. 85).

M. virens sens. str. is a larger species (2.5 to 3.3 mm. in wing length) than the one considered by Malloch to be *M. virens*. Malloch had specimens of *M. virens* sens. str. under the manuscript name of *Agromyza lasiops*. The orbital setulae are very irregular, with the posteriormost being erect (fig. 42). The eyes are setulose, particularly in the males, and the mesonotum and abdomen have a greenish sheen. No specimens reared from larvae are known. The species has been found in Illinois, Indiana, District of Columbia, Maryland, New Jersey, Pennsylvania, and Massachusetts.

***Melanagromyza viridis* (Frost)**

Agromyza viridis Frost, Canadian Ent., vol. 63, p. 277, 1931.

The holotype female is in the U. S. National Museum (No. 62964). *M. viridis* is a moderately sized species with a relatively high, narrow eye (fig. 43). The antennae are somewhat ventrally situated and the lunule is very high—subequal to the height of the frontal vitta. The type series was reared from *Zinnia* sp., and I have identified two reared from *Encelia* sp. as belonging to the same species. Both lots are from the southern half of California.

***Melanagromyza winnemanae* (Malloch)**

Agromyza winnemanae Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 314, 1913.

This is the only species in the group with reclinate orbital setulae, white calypteral fringe, and without metallic sheen that has the costa terminating at vein R_{4+5}. The head in profile shows no unusual

features (fig. 44) but the antennae are separated by one-half the diameter of a basal antennal segment. The type female from Maryland is the only known specimen.

3. Genus *Ophiomyia* Braschnikov

Ophiomyia Braschnikov, Ann. Inst. Agr. Moscow, vol. 3, p. 40, 1897.

This is a relatively small genus that is characterized by having the halteres black, the orbital setulae reclinate, and a fusiform carina between the antennae (fig. 45). The males of all but one European species have a fasciculus at the vibrissal angle (fig. 51). This fasciculus may be composed of only a few setae (fig. 47) or it may be very short (fig. 48). The vibrissa of the females is always a single seta (fig. 52). There are 11 North American species of which four are Neotropical, five are Nearctic, and two are found in both regions. Three species are Holarctic, with one, *O. proboscidea*, extending into Central America.

None of the North American species has the costa reaching only to R_{4+5}, while 7 out of 13 Palaearctic species have the costa abbreviated. *O. punctohalterata* is unique in having a white spot on the knob of the halter.

There is one group of species that is sufficiently closely related to be called a species group, the *proboscidea* group (couplet 3). These species have the vibrissal angle extended anteriorly into an acute angle (figs. 48, 51, 53, 54). The remaining species are widely divergent from one another.

Key to the described species of *Ophiomyia*

1. Halter black 2
   Halter with a white spot on the knob . . . . . **punctohalterata**
2. Head, viewed in profile, with a vibrissal angle of 45° to 60° (fig. 51) 3
   Head, viewed in profile, with a vibrissal angle of about 90° (fig. 49) 5
3. Head with subcranial margin straight (figs. 48, 51) 4
   Head with subcranial margin curved (figs. 53, 54) . . . . . **texana**
4. Anterior half of mesonotum with six to eight rows of acrostichal setae; head with vibrissal angle about 60° (fig. 51) . . . . . **proboscidea**
   Anterior half of mesonotum with nine to ten rows of acrostichals; vibrissal angle about 45° (fig.48). . . . . **coniceps**
5. Head, viewed in profile, with gena narrow, midway between vibrissal and posterior angles from one-fifth to one-eighth the eye height (fig. 49) . . . 6
   Head, viewed in profile, with gena wide, midway between vibrissal and posterior angles about one-third the eye height. . . . . **major**
6. Calypter with margin and fringe dark brown to black 7
   Calypter with margin and fringe whitish. . . . . **buscki**
7. Anterior half of mesonotum with acrostichal setae in nine to ten irregular rows 8
   Anterior half of mesonotum with acrostichal setae in six to eight irregular rows 9

8. Midtibia medially with one or two setae; head, viewed in profile, with genovertical plates not extending beyond eye margin (fig. 49) . . . **curvibrissata**
   Midtibia medially without setae; genovertical plates extending beyond eye margin (fig. 47) . . . . . **congregata**
9. Vein M_{3+4} with ultimate section shorter than penultimate; crossvein r-m distinctly distad of junction of R_1 in the costa 10
   Vein M_{3+4} with ultimate section subequal to the penultimate; r-m directly beneath the junction of R_1 in the costa. . . . . **insularis**
10. Head, viewed in profile, with gena one-seventh to one-eighth the eye height; eye four-fifths as long as high. . . . . **maura**
    Head viewed in profile, with gena one-fifth to one-sixth the eye height; eye two-thirds as long as high. . . . . **lantanae**

Ophiomyia buscki (Frost)

Agromyza buskei Frost, Ann. Ent. Soc. Amer., vol. 29, p. 315, 1936.

The proboscis is greatly elongate and the fasciculus at the blunt vibrissal angle is very small (fig. 46). The gena is relatively narrow and the calypteral fringe is white. The holotype male, the only known specimen, was collected in the Panama Canal Zone.

Ophiomyia congregata (Malloch)

Agromyza congregata Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 328, 1913.

This species is somewhat intermediate between *Melanagromyza* and *Ophiomyia* as stated by Shewell (1953). It is closer to *Ophiomyia* in having a slight median carina widening below the antennal bases, divergent antennae, and a definite, if sparse, fasciculus at the vibrissal angle (fig. 47). This is a large species with a wing length of more than 2 mm. I have seen specimens from Arizona, Colorado, and North Dakota.

Ophiomyia coniceps (Malloch)

Agromyza coniceps Malloch, Proc. U. S. Nat. Mus., vol. 49, p. 107, 1915 (figure of head).

The holotype is headless but Malloch illustrated the head and I have included one from a male collected at Santa Cruz, Calif. This species has an extremely elongate vibrissal angle (fig. 48). The larvae mine the stems of *Sonchus asper* (L.). The species is widespread and I have assigned specimens to it from Washington, California, Utah, Louisiana, Indiana, Manitoba, and Quebec.

Ophiomyia curvibrissata (Frost)

Agromyza curvibrissata Frost, Ann. Ent. Soc. Amer., vol. 29, p. 309, 1936.

The holotype male and a female on the same pin are in the U. S. National Museum (No. 62974). The eye is subrectangular and relatively long for its height (fig. 49). The vibrissal fasciculus is elongate, being about one-half the eye height in length. The two type specimens are from Guatemala.

***Ophiomyia insularis* (Malloch)**

Agromyza insularis Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 318, 1913 (figure of male head).

The male from which Malloch illustrated the head is now represented by part of one wing. The female is in good condition and the head is illustrated (fig. 50). The head is very similar to that of *O. lantanae* except that the gena is a little higher in this species. The type is from Cuba.

***Ophiomyia lantanae* (Froggatt)**

Agromyza lantanae Froggatt, Agr. Gaz. New South Wales, vol. 30, p. 665, 1919.
Agromyza curvipalpis (Zetterstedt), Melander (part), Journ. New York Ent. Soc., vol. 21, p. 251, 1913 (4 from Hawaii).
Agromyza longicauda Curran, Scientific survey of Porto Rico and the Virgin Islands, vol. 11, pt. 1, p. 65, 1928.

O. lantanae is similar to *O. maura* but has the gena wider and the eye is relatively high and narrow like that of *O. insularis* (fig. 50). The larvae feed in the seeds of *Lantana camara* L. and possibly other *Lantana* sp. I have seen specimens reared from larvae from southern California, southern Texas, and Florida in the United States. Other North American localities include Cuba, Puerto Rico, Trinidad, Panama, Costa Rica, and Honduras.

***Ophiomyia major* (Strobl)**

Agromyza major Strobl, Wiss. Mitt. Bosnien Herzegovina, vol. 7, p. 266, 1900.
Ophiomyia major (Strobl), Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 187, 1931 (figure of head).
Agromyza vibrissata Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 316, 1913 (figures of ♂ and ♀ heads and wing).

This is a large species (2.75 mm. in wing length) for an *Ophiomyia*. The gena is high (about one-third the eye height), only the dorsal upper-orbital seta is reclinate, and the most ventral lower-orbital is reclinate as well as inwardly directed. No larval host plants are known, even in Europe where *O. major* is rather widespread. The type series of *O. vibrissata* is from Georgia.

***Ophiomyia maura* (Meigen)**

Agromyza maura Meigen, Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten, vol. 7, p. 399, 1838.
Ophiomyia maura (Meigen), Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 188, 1931 (figures of ♂ and ♀ heads and wing).
Agromyza affinis Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 317, 1913.
Agromyza texana (Malloch), Frost (part), Mem. Cornell Univ. Agr. Exp. Sta., vol. 78, p. 42, 1924 (figures of leaf mines on *Aster* sp. and *Solidago* sp.).

This species is similar to *O. lantanae* but has a very narrow gena and the eye is relatively wide for its height (in a ratio of 4:5). The vibrissal fasciculus of the male is shorter (about one-third of the eye

height) than that of *O. lantanae* (about one-half). The larvae form long slender mines in the leaves of species of *Solidago* and *Aster*. I have identified specimens from California, Michigan, New York, Pennsylvania, Maryland, and Georgia as belonging to this species.

***Ophiomyia proboscidea* (Strobl)**

Agromyza proboscidea Strobl, Wiss. Mitt. Bosnien Herzegovina, vol. 7, p. 641, 1900.
Ophiomyia proboscidea (Strobl), Hendel, *in* Lindner Die Fliegen der palaearktischen Region, fam. 59, p. 194, 1931 (figures of head and wing).
Agromyza oralis Frost, Ann. Ent. Soc. Amer., vol. 29, p. 309, 1936.

This species is certainly very similar to *O. texana* but may be separated by the straight subcranial margin (fig. 51), the somewhat shorter male fasciculus, and the slightly larger size of about 2 mm. in wing length (about 1.75 mm. for *O. texana*). The larvae mine in species of *Hieracium* and *Satureia* in Europe and it has been reared from *Nepeta* sp. in North America. Only a few specimens have been identified as *O. proboscidea* and they were from Michigan, Indiana, New York, New Jersey, and Louisiana, in the United States, and from Guatemala.

***Ophiomyia punctohalterata* (Frost)**

Agromyza punctohalterata Frost, Ann. Ent. Soc. Amer., vol. 29, p. 311, 1936.

The holotype female is in the U. S. National Museum (No. 62968). There is also a paratype female in the S. W. Frost collection. The head is high and narrow and is forwardly inclined (fig. 52). The halter has a white spot on the knob, which is a unique character for this genus. Known from two specimens collected in Guatemala.

***Ophiomyia texana* (Malloch)**

Agromyza texana Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 319, 1913.

The slightly smaller size (1.75 mm. in wing length as against 2 mm. for *O. proboscidea*) and the curving subcranial margin (figs. 53, 54) serve to separate this species from *O. proboscidea*. The larvae have been reared from stem mines in two cruciferous plants, *Roripa* sp. and *Sophia* sp. *O. texana* is spread across the United States from Washington, Utah, New Mexico, Texas, Colorado, Wyoming, Kansas, and South Dakota, to Illinois, Indiana, and Michigan.

4. Genus *Tylomyza* Hendel

Tylomyza Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 181, 1931 (as subgenus).

This is a small genus of two species, one Palaearctic (*T. pinguis* Fallén) and the other Holarctic (*T. nasuta* Melander). There is a hemispherical carina between the antennae, and the orbital setulae

are all proclinate. The males lack the upper-orbital setae (fig. 55). The mouthparts, including the labella, are greatly elongate.

***Tylomyza nasuta* (Melander)**

Agromyza nasuta Melander, Journ. New York Ent. Soc., vol. 21, p. 260, 1913.
Agromyza curvipalpis (Zetterstedt), Melander (part), Journ. New York Ent. Soc., vol. 21, p. 251, 1913 (4 ♀ ♀, Idaho and Washington).
Agromyza simplex (Loew), Melander (part), Journ. New York Ent. Soc., vol. 21, p. 252, 1913 (1 ♀, White Plains, N. Y.).
Agromyza youngi Malloch, Ent. News, vol. 25, p. 312, 1914.
Ophiomyia madizina (Hendel), Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 185, 1931 (figures of head and wing).

This is a Holarctic species that may be distinguished from the Palaearctic *T. pinguis* by the three dorsocentral setae (the anterior is about one-half the length of the posterior) and crossvein m-m being less than (from one-third to three-fourths) its own length from r-m (fig. 56). The head is illustrated to show the proclinate orbital setulae and the absence of the upper-orbital setae in the male (fig. 55). The larvae have been reared from *Taraxacum officinale* Weber (=*T. dens-leonis*). I have seen specimens from across the northern half of the United States from Washington to New York and from Ontario and Quebec in Canada.

5. Genus *Phytobia* Lioy

Phytobia Lioy, Atti Ist. Veneto, ser. 3, vol. 9, p. 1313, 1864.
Dizygomyza Hendel, Arch. Naturg., Abt. A, vol. 84, p. 130, 1920.

The genus *Phytobia* contains 52 described species, making it the largest in North America. No other genus has such a diversity of species, not only in regard to adult morphology but that of the larvae as well. Ten subgenera have been described in an effort to systematically arrange all of the diverse groups. Giving generic status to them is not accepted herein because of the annectant species found throughout the genus and the over-all similarity of the male terminalia (Frick, 1952).

Two unusual species have been described from the Neotropical region. The first is *P.* (*Phytobia*) *kallima* that has the wings marked with brown (fig. 60). The other is *P.* (*Phytobia*) *picta* that has the scutellum and sides of the mesonotum yellow (fig. 61). Such a character usually places a species into *Liriomyza* and would do so in this case except that vein R_{4+5} is nearer the wing tip than is M_{1+2} (fig. 60) and the midtibia bears strong setae medially.

The similarity between *Phytobia* and *Liriomyza* also may be shown by the enlarged third segment of the male antennae. Such a characteristic is common to the subgenus *Dizygomyza* (fig. 80). One *Liriomyza* species, *commelinae*, also has the third segment enlarged (fig. 102).

All of the 10 Palaearctic subgenera are represented in North America and there are no subgenera peculiar to this continent. The numbers of species found in each subgenus except *Calycomyza* are in about the same proportions in the Palaearctic region as they are in North America. Subgenus *Calycomyza* contains only five Palaearctic species while it has 17 in North America north of Panama.

The arrangement of subgenera has always been somewhat arbitrary and was originally based upon a combination of adult and larval characters (Hendel, 1931). I have modified the position of two subgenera. Subgenus *Amauromyza* is placed next to subgenus *Nemorimyza* and therefore close to subgenus *Phytobia*. This puts the larger, dark colored species together into a group of less specialized genera.

Subgenus *Dizygomyza* properly belongs with subgenus *Icteromyza* on the basis of the form of the lunule and close to subgenus *Poëmyza*, according to the recent work of Groschke (1954) and my study of *Phytobia* (*Dizygomyza*) *thompsoni*. Groschke has described species in subgenus *Poëmyza* that have a low lunule approaching those found in subgenus *Dizygomyza*, while I found a very high lunule in *Phytobia* (*Dizygomyza*) *thompsoni* (fig. 83). However, in spite of the height of the lunule in the latter species, the lunule is in the plane of the frontal vitta and is sharply raised above the mesofacial plate. The highly modified forms of the posterior spiracles of the larvae also indicate a close relationship between these three subgenera.

Key to the subgenera of *Phytobia*

1. Halter with knob white or yellow. 2
   Halter with knob partially or entirely brown or black . . **5c. Amauromyza**
2. Lunule low, with height less than one-half the width of the lunule at the antennal bases (fig. 92); if higher, then either frontal vitta entirely bright yellow (fig. 85) or lunule in the plane of the frontal vitta and abruptly raised above the mesofacial plate (fig. 83) 3
   Lunule higher, height more than one-half its width (fig. 78); frontal vitta at least one-half brown or black and in the plane of the mesofacial plate, somewhat sunken below the frontal vitta . . . . . **5c. Poëmyza**
3. Antennal bases widely separated; lunule broad, large, semicircular above, in the plane of the frontal vitta, abruptly raised above the mesofacial plate (fig. 83) 4
   Antennal bases usually approximate, or if separated, then lunule flattened above, angulate outwardly (fig. 65); or lunule smaller, in the plane of the mesofacial plate, somewhat sunken below the frontal vitta (fig. 92) . . . 5
4. Frontal vitta primarily brown or black; frontal triangle not larger than ocellar triangle (fig. 83). . . . . **5f. Dizygomyza**
   Frontal vitta bright yellow; frontal triangle reaching lunule (fig. 85). **5g. Icteromyza**
5. Vein R_{4+5} ending nearest wing tip; prescutellar seta developed 6
   Vein M_{1+2} ending nearest wing tip; prescutellar absent or not differentiated . 7

6. Presutural dorsocentral present. . . . . **5a. Phytobia**
   Presutural dorsocentral absent. . . . . **5b. Nemorimyza**
7. Head with two upper-orbital setae reclinate; gena narrow (fig. 89), posteriorly not more than one-third of the eye height; if higher (fig. 93), then femora yellow. 8
   Head usually with only one upper-orbital, or if two, then only dorsal one reclinate; gena wide (fig. 67), posteriorly about one-half of the eye height; femora primarily dark . . . . . **5d. Cephalomyza**
8. Mesonotum usually with one presutural and three postsutural dorsocentral setae, if with only three postsuturals, then anepisternum and femora yellow . . 9
   Mesonotum with either only three postsutural dorsocentrals or with four postsutural and none to three presuturals; anepisternum and femora mostly black . . . . . **5h. Calycomyza**
9. Genovertical plates at most slightly raised above the frontal vitta, usually in the plane of the frontal vitta (fig. 88) . . . . . **5i. Trilobomyza**
   Genovertical plates very abruptly raised above the frontal vitta, distinctly above the plane of the frontal vitta (fig. 92) . . . . . **5j. Praspedomyza**

5a. Subgenus *Phytobia* Lioy

Phytobia Lioy, Atti Ist. Veneto, ser. 3, vol. 9, p. 1313, 1864.
Dendromyza Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 22, 1931.

This is considered a generalized subgenus, based upon adult morphology. There is usually more than one intraalar seta, a well developed prescutellar, usually one or more posterolateral setae medially on the midtibia, and vein R_{4+5} ends closest to the wing tip (fig. 60). There are usually four well-developed dorsocentrals but Kangas (1955) has found species in Europe with only two or three, one always being presutural. The flies are large and the wing length ranges from 2.5 to 5.0 mm. The larvae mine in the cambium of various woody plants. The larvae are highly specialized and vary from 15 to 30 mm. in length and up to 1 mm. in diameter when full grown. The posterior spiracles each consist of three short bulbs.

This subgenus is well represented in North America. Only two of the species are Neotropical and are very unusual in that *P. kallima* has brown markings on the wing (fig. 60) and the other, *P. picta*, has the scutellum and mesonotal margins yellow. Of the Nearctic species, *P. waltoni* is unusual in lacking medial setae on the midtibia.

Key to the described species of *Phytobia* (*Phytobia*)

1. Scutellum concolorous with mesonotum, black or heavily gray pollinose . . 2
   Scutellum and margin of mesonotum yellow, central part of mesonotum dull black (fig. 61) . . . . . **picta**
2. Wing without brown markings 3
   Wing with brown markings (fig. 60). . . . . **kallima**
3. Costa reaching to the end of R_{4+5}, or slightly beyond 4
   Costa reaching to the end of M_{1+2} 5

4. Vein M_{3+4} with the ultimate section about 1.5 times as long as the penultimate . . . . . **pruni**
   Vein M_{3+4} with the ultimate section from 2 to 2.5 times as long as the penultimate. . . . . **indecora**
5. Maxillary palpus black or brown 6
   Maxillary palpus yellow . . . . . **pruinosa**
6. Third antennal segment reddish; crossvein m-m about its own length from r-m. 7
   Third antennal segment brown; m-m not more than six-tenths of its length from r-m. . . . . **waltoni**
7. Head with only one upper-orbital reclinate (fig. 57); dorsal margin of lunule semicircular, smoothly curving (fig. 58); midtibia medially with three posterolateral setae . . . . . **amelanchieris**
   Head with both upper-orbitals reclinate (fig. 64); dorsal margin of lunule flattened, outwardly angulate (fig. 65); midtibia medially with one or two posterolateral setae. . . . . **setosa**

Phytobia (*Phytobia*) *amelanchieris* (Greene)

Agromyza setosa (Loew), Melander, Journ. New York Ent. Soc., vol. 21, p. 253, 1913.

Agromyza amelanchieris Greene, Journ. Agr. Res., volume 10, p. 314, 1917 (figures of larva and puparium).

P. amelanchieris is most closely related to *P. setosa* but has the eye about as long as high (fig. 57) and the lunule smoothly rounded above (fig. 58). Also there are at least three lower-orbitals and all of the femora are distally reddish. The larvae mine the cambium of *Amelanchier canadensis* (L.). Melander has a specimen of this species in his collection from Oroville, Wash., labeled as *Agromyza pruinosa*, thereby extending the distribution to the far west. The species is now known from Washington, Michigan, Tennessee, North Carolina, West Virginia, and Massachusetts.

Phytobia (*Phytobia*) *indecora* (Malloch)

Agromyza indecora Malloch, Canadian Ent., vol. 50, p. 132, 1918.

The head of the type male is illustrated to show the three lower-orbitals (fig. 59). There are frequently as many as four or five. This species is similar to *P. pruni* in having the costa ending at vein R_{4+5}. *P. indecora* may be separated by the long ultimate section of M_{3+4} (2 to 2.5 times as long as the penultimate). No larval host plants are known. I have seen about 44 specimens, all from Illinois.

Phytobia (*Phytobia*) *kallima* (Frost)

Agromyza kallima Frost, Ann. Ent. Soc. Amer., vol. 29, p. 299, 1936.

This species is unique in having brown markings on the wing (fig. 60). *P. kallima* is known only from the holotype male from Barro Colorado Island, Panama Canal Zone.

***Phytobia* (*Phytobia*) *picta* (Coquillett)**

Agromyza picta Coquillett, Journ. New York Ent. Soc., vol. 10, p. 188, 1902.
Agromyza dorsocentralis Frost, Ann. Ent. Soc. Amer., vol. 29, p. 307, 1936.

P. picta is a striking and unique species in that the scutellum and margin of the mesonotum are yellow (fig. 61). The head is somewhat unusual in not having the genovertical plates extending beyond the eye margin (fig. 62). No larval host plants are known. Specimens have been studied from Mexico, Honduras, Costa Rica, and the Panama Canal Zone. The New Mexico specimen referred to by Malloch (1913) could not be found.

***Phytobia* (*Phytobia*) *pruinosa* (Coquillett)**

Agromyza pruinosa Coquillett, Journ. New York Ent. Soc., vol. 10, p. 189, 1902—Greene, Journ. Agr. Res., vol. 1, p. 471, 1914 (figures of adult, puparium, larva, and cambium mines).

This species is similar to *P. amelanchieris* in the shape of the head and in having one upper-orbital seta reclinate and three lower-orbitals (fig. 63). However, the maxillary palpus is yellow and the femora are brown in *P. pruinosa*. The larvae mine the cambium of *Betula nigra* L. The species is known from Colorado, Illinois, District of Columbia, and New York.

***Phytobia* (*Phytobia*) *pruni* (Grossenbacher)**

?*Agromyza nigripes* (Meigen), Melander, Journ. New York Ent. Soc., vol. 21, p. 254, 1913.
Agromyza pruni Grossenbacher, Bull. Torrey Bot. Club, vol. 32, p. 235, 1915 (figure of wing).—Malloch, Bull. Illinois Nat. Hist. Surv., vol. 11, p. 349, 1915 (figures of ovipositor, larval and puparial characters).

Melander has in his collection a female from Colorado that does not entirely conform to Malloch's redescription. Because none of Grossenbacher's specimens could be located, a positive identification is impossible. The species is similar to *Phytobia indecora* in having the costa terminate at vein R_{4+5}, but *P. pruni* has the ultimate section of M_{3+4} only about 1.5 times as long as the penultimate. Grossenbacher's specimens were reared from the cambium of *Prunus avium* and *Prunus domestica* in New York.

***Phytobia* (*Phytobia*) *setosa* (Loew)**

Agromyza setosa Loew, Berliner Ent. Zeitschr., vol. 13, p. 45, 1869 (Centuria VIII, No. 83).
Agromyza aceris Greene, Journ. Agr. Res., vol. 10, p. 313, 1917 (figures of larva and puparium).

Most closely related to *P. amelanchieris*, this species has the eye higher than wide (fig. 64), lunule flattened above (fig. 65), usually two lower-orbital setae, and the femora distally brownish. The larvae

mine the cambium of *Acer rubrum* L. I have seen specimens from Iowa, Indiana, Michigan, Virginia, District of Columbia, Maryland, New York, Massachusetts, and Quebec.

***Phytobia* (*Phytobia*) *waltoni* (Malloch)**

Agromyza waltoni Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 303, 1913 (figures of head and wing).

This species differs from *P. amelanchieris* and *P. setosa* in having a brown antenna, crossvein m-m not more than six-tenths of its length from r-m, and the lack of medial posterolateral setae on the midtibia. It was originally described from a female from northern New York. There is a male from Tennessee in the Iowa State College collection.

5b. Subgenus *Nemorimyza* Frey

Nemorimyza Frey, Notulae Ent., vol. 26, p. 42, 1946.

This subgenus was erected for a single species having the characters of *Phytobia* except that the presutural dorsocentral is absent. Such a separation is justified because the larva is a leaf miner of the usual type and is up to 5 mm. long when full grown. There are three short bulbs on each posterior spiracle.

***Phytobia* (*Nemorimyza*) *posticata* (Meigen)**

Agromyza posticata Meigen, Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten, vol. 6, p. 172, 1830.—Frost, Mem. Cornell Univ. Agr. Exp. Sta., vol. 78, p. 50, 1924 (figure of leaf mine).

Dizygomyza (*Dendromyza*) *posticata* (Meigen), Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 30, 1931 (figure of head and wing).

Agromyza terminalis Coquillett, Proc. Acad. Nat. Sci. Philadelphia, vol. 47, p. 318, 1895.

Agromyza taeniola Coquillett, Proc. Ent. Soc. Washington, vol. 6, p. 191, 1904.

Agromyza parvicornis (Loew), Melander (part), Journ. New York Ent. Soc., vol. 21, p. 254, 1913 (1 ♀, Wisconsin).

This species is shining black and has the lunule white tomentose, only three postsutural dorsocentrals, setae medially on the midtibia, vein R_{4+5} nearest the wing tip, and the male abdomen primarily yellow. It is a very common and widespread Holarctic species. The larvae form blotch mines in the leaves of species of *Solidago* and *Aster*. There are specimens from States in all parts of the country and it may be considered as occurring throughout the United States. I have seen specimens from Ontario and Quebec in Canada.

5c. Subgenus *Amauromyza* Hendel

Amauromyza Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 59, 1931.

This is a small subgenus that has six European species (Hendel, 1931) and two North American species. The halter is totally or

partially brown or black. One North American species, *Phytobia maculosa*, is atypical; the characters it has in common with *Phytobia* were discussed by Frick (1952). The larvae have three bulbs on each posterior spiracle, none of which are elongate or modified.

Key to the described species of *Phytobia* (*Amauromyza*)

1. Halter dark brown; mesonotum dull brown . . . . . **abnormalis**
   Halter black with a white spot on knob; mesonotum shining black . **maculosa**

***Phytobia* (*Amauromyza*) *abnormalis* (Malloch)**

Agromyza abnormalis Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 320, 1913 (figure of wing).

Dizygomyza (*Amauromyza*) *abnormalis* (Malloch), Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 59, 1931 (figures of head and wing).

This Holarctic species is completely dull brown to black with the halter, wing base, and calypter dark. Even the wing is not clear, but has a gray to brownish tinge. The larvae mine the stems of *Amaranthus* spp. and *Chenopodium album* L. I have seen specimens from Kansas, Iowa, and District of Columbia.

***Phytobia* (*Amauromyza*) *maculosa* (Malloch)**

Agromyza maculosa Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 302, 1913.

Unique among North American *Phytobia* species in having a black spot on the knob of the halter. Frick (1952) discussed the subgeneric position of this species and listed four host plants. Other larval hosts include *Chrysanthemum* spp., *Bidens pilosa* L., *Helianthus annuus* L., and *Lactuca sativa*, cultivated var. The larvae form large blotch mines. The species is widespread in the United States and is also known from Bermuda, Jamaica, Puerto Rico, Uruguay, Argentina, and Hawaii.

5d. Subgenus *Cephalomyza* Hendel

Cephalomyza Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 32, 1931.

This subgenus is an odd and diverse group that has the frontal vitta, antenna, and mesofacial plate primarily yellow, either has one upper-orbital or has two with only one upper-orbital reclinate, gena posteriorly about one-half the eye height, genovertical plates extending beyond the eye margin (fig. 66), an epistoma present between the subcranial margin and the mesofacial plate, and the legs primarily dark. The larvae of one European species is known and each posterior spiracle bears about nine bulbs.

Key to the described species of *Phytobia* (*Cephalomyza*)

1. Mesonotum with two or three well-developed dorsocentral setae; genovertical plates dark from vertex to lowest orbital seta (fig. 67) 2
   Mesonotum with four well-developed dorsocentral setae; genovertical plates dark from vertex to upper-orbital, lower-orbitals on yellow (fig. 68) . **indecisa**
2. Mesonotum dull black, somewhat pollinose; third antennal segment dark brown to black (fig. 67) . . . . . **auriceps**
   Mesonotum shining black; third antennal segment yellowish (fig. 66). **albidohalterata**

Phytobia (*Cephalomyza*) *albidohalterata* (Malloch)

Agromyza albidohalterata Malloch, Psyche, vol. 23, p. 52, 1916.
Phytobia (*Cephalomyza*) *albidohalterata* (Malloch), Frick, Canadian Ent., vol. 85, p. 69, 1953.

The figure of the head (fig. 66) is of a male from White Heath, Ill., because the head of the type male is partially collapsed. This is a shining black species that has the femora narrowly light brown distally and with not more than three well-developed dorsocentral setae. *Phytobia* (*Cephalomyza*) *albidohalterata* is atypical for this subgenus in having two upper-orbital setae, but only the dorsal is reclinate. There are specimens from Iowa and Illinois.

Phytobia (*Cephalomyza*) *auriceps* (Melander)

Agromyza auriceps Melander, Journ. New York Ent. Soc., vol. 21, p. 262, 1913.

A rather large species (2.25 mm. in wing length) that differs from *Phytobia* (*Cephalomyza*) *albidohalterata* in having the third antennal segment dark brown (fig. 67), the mesonotum dull, and the femora entirely dark brown. The type series is from Idaho and Colorado

Phytobia (*Cephalomyza*) *indecisa* (Malloch)

Agromyza indecisa Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 292, 1913.

This species (fig. 68) is the most yellow of the three in the subgenus, with the antenna, maxillary palpus, and most of the genovertical plates being of that color. The femora are brown with yellowish streaks. There is a single specimen, a female from New Mexico.

5e. Subgenus *Poëmyza* Hendel

Poëmyza Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 35, 1931.

The species included in this subgenus were once considered to be very distinctive in having a high lunule laterally constricted by the genovertical plates (fig. 78). However, Groschke (1954) described European species that have a much lower lunule and modified the key to read: "Height more than one-half its width; frontal vitta at least

one-half brown or black." But I have had to consider the plane of the lunule because of the very high lunule of *Phytobia* (*Dizygomyza*) *thompsoni;* this lunule is in the plane of the frontal vitta and abruptly raised above the mesofacial plate (fig. 83). The lunule in the subgenus *Poëmyza* is in the plane of the mesofacial plate and is somewhat sunken below the frontal vitta. The genovertical plates are broad, rather sharply raised above the plane of the frontal vitta, and usually widest immediately dorsal of the antennal base (fig. 78). The larvae have three bulbs on each posterior spiracle (fig. 71). These are variously modified and are usually strongly sclerotized. One or two of the bulbs may be greatly elongate and acuminate.

Of the six described species of this subgenus, four are Holarctic and none is Neotropical. *Phytobia* (*Poëmyza*) *angulata* and *Phytobia* (*Poëmyza*) *subangulata* belong to the *scutellaris* group that has the prescutellar seta developed. The larvae of species whose life histories are known mine the leaves of species in the plant family Cyperaceae. Those without a prescutellar seta mine the leaves of species of Gramineae.

Phytobia atra has been deleted from the North American list. Frick (1952) took the synonymy of Hendel (1931). A subsequent study of the specimens showed that *P. angulata* of Melander is *angulata* sens. str. and the *angulata* of Malloch (1931) is actually *P. incisa.*

Key to the described species of *Phytobia* (*Poëmyza*)

1. Mesonotum with prescutellar seta present and developed 2
   Mesonotum with prescutellar seta absent or not differentiated 3
2. Crossvein r-m beyond center of cell 1–M_2; m-m about its own length from r-m (fig. 77); forefemur distally yellow, others dark . . . . . **subangulata**
   Crossvein r-m about at center of cell 1–M_2; m-m about 1.5 times its length from r-m; all femora distally yellow . . . . . **angulata**
3. Femora distally dark or, if yellow, then for a distance subequal to the femoral diameter 4
   Femora distally yellow for one-third to one-half the femoral length . **muscina**
4. Vein M_{3+4} with ultimate section about 1.5 times as long as penultimate; humerus and notopleural triangle dark 5
   Vein M_{3+4} with ultimate section subequal to penultimate; notopleural triangle and part of humerus yellow . . . . . **lateralis**
5. Legs with all femora distally yellow . . . . . **inconspicua**
   Legs with forefemur yellow, others dark . . . . . **incisa**

Phytobia (*Poëmyza*) *angulata* (Loew)

Agromyza angulata Loew, Berliner Ent. Zeitschr., vol. 13, p. 47, 1869 (Centuria VIII, No. 87).

Agromyza neptis Loew, Berliner Ent. Zeitschr., vol. 13, p. 50, 1869 (Centuria VIII, No. 93).

Dizygomyza semiposticata Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 49, 1931 (figures of head, wing, and puparial characters).

Agromyza cinereifrons Frost, Canadian Ent., vol. 63, p. 276, 1931.

Phytobia angulata is close to *P. subangulata* because both have the prescutellar seta present. However, the former has the eye smoothly rounded anteriorly (fig. 69) as compared to the irregular curvature shown by *P. subangulata* (fig. 79). The lunule is not abruptly narrowed immediately above the antenna as it is in *P. subangulata* (fig. 78). All femora are narrowly yellow distally. The wing has crossvein r-m at about the center of cell 1–M_2 and m-m is about 1.5 times its length from r-m. There are no North American specimens known to me that have been reared, but the larvae mine species of *Carex* in Europe. There are specimens from widely scattered States and it is probable that the species is present in every State of the United States. It is known from Ontario and Quebec in Canada.

***Phytobia* (*Poëmyza*) *incisa* (Meigen)**

Agromyza incisa Meigen, Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten, vol. 6, p. 182, 1830.

Dizygomyza (*Poëmyza*) *incisa* (Meigen), Hendel, Die Fliegen der palaearktischen Region, fam. 59, p. 38, 1931 (figures of head, wing, and puparial characters).

This species is rather distinctive in having crossvein m-m approximately beneath the junction of R_1 in the costa. The prescutellar seta is not developed and the species is subshining black with only the forefemur yellow distally. *Phytobia inconspicua* is similar but has all femora distally yellow. The larvae form blotch mines in the leaves of many species of grass. There may be several larvae per mine. Frick (1952) listed four host plants; other North American grasses from which adults have been reared are *Phleum pratense L.*, *Triticum aestivum* L., *Setaria lutescens* (Weigel) Hubb., and *Phalaris arundinacea* L. There are specimens from many States in the northern half of the United States and from Ontario in Canada.

***Phytobia* (*Poëmyza*) *inconspicua* (Malloch)**

Agromyza inconspicua Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 310, 1913.

This species is very similar to *Phytobia incisa* but is smaller (1.75 mm. in wing length), has the third antennal segment slightly angulate, and has all femora distally yellow. The head of the type (fig. 70) is somewhat distorted because the specimen is teneral. This species is known from a single male reared from a mine on *Agropyron* sp. in Colorado. The puparium is on the same pin and illustrations of the posterior end and spiracles are included (figs. 71, 72, and 73). The spiracles are different from any others that I have seen.

***Phytobia* (*Poëmyza*) *lateralis* (Macquart)**

Agromyza lateralis Macquart, Histoire naturelle des Insectes, Diptera, vol. 2, p. 609, 1835.

Dizygomyza (*Poëmyza*) *lateralis* (Macquart), Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 40, 1931 (figures of head and wing).

Agromyza coquilletti Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 295, 1913 (figure of head).

Agromyza marginata (Loew), Melander, Journ. New York Ent. Soc., vol. 21, p. 256, 1913.

Paratype males of *Phytobia coquilletti* were compared with two males lent by E. M. Hering. The distinctive keel on the ninth tergite (figs. 74, 75), first described by Shewell (1953), is also present on the European males. Malloch's figure of the head is somewhat inaccurate and I have redrawn it (fig. 76). This species is quite yellow with most of the head, most of the humerus, notopleural triangle, all femora distally, and all tergites posteriorly being yellowish. The larvae mine the leaves of many species of grass and there are North American records from the following: *Avena sativa* L., *Elymus canadensis* L., *Hordeum jubatum* L., *Triticum aestivum* L., and *Zea mays* L. I have seen specimens from many of the States in the northern half of the United States and from Manitoba in Canada.

***Phytobia* (*Poëmyza*) *muscina* (Meigen)**

Agromyza muscina Meigen, Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten, vol. 6, p. 177, 1830.

Dizygomyza (*Poëmyza*) *muscina* (Meigen), Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 44, 1931 (figures of head and wing).

Agromyza marginata Loew, Berliner Ent. Zeitschr., vol. 13, p. 49, 1869 (Centuria VIII, No. 91).

Agromyza superciliosa (Zetterstedt), Melander, Journ. New York Ent. Soc., vol. 21, p. 256, 1913.

Phytobia muscina is a distinctive species because the femora are distally yellow for about one-third of their length. The genovertical plates are yellowish on the dorsal half and usually are brownish for the full length, contrasting with the black frontal vitta. The larvae mine the leaves of several species of grass. The only reared specimens that I have seen from North America were from leaf mines on *Agropyron repens* (L.), *Ehrharta erecta* Lam., and *Hordeum murinum* L. I have seen specimens from California (including Los Angeles), Oregon, Washington, Idaho, Illinois, Indiana, Michigan, District of Columbia, Maryland, Pennsylvania, New York, and Massachusetts. The species also occurs in the North West Territories of Canada.

***Phytobia* (*Poëmysa*) *subangulata* (Malloch)**

Agromyza subangulata Malloch, Psyche, vol. 23, p. 51, 1916.

This species is similar to *Phytobia angulata* in having the prescutellar seta developed. However, it differs in having only the forefemur distally yellow, the other femora distally reddish brown, crossvein r-m definitely distad of center of cell 1–M_2 and slightly beyond the junction of R_1 in the costa (fig. 77). There is a narrow but rather

prominent keel between the antennae, and the lunule is abruptly narrowed immediately dorsad of the antenna (fig. 78). The eye is not as smoothly rounded anteriorly (fig. 79) as it is in *P. angulata* (fig. 69). I have seen no reared specimens but in Europe this group mine the leaves of species of *Carex, Cyperus,* and *Scirpus.* I have identified only a few specimens as belonging to this species, all from Illinois. Most of the specimens Malloch placed under *Phytobia subangulata* belong to *P. angulata* sens. str.

5f. Subgenus *Dizygomyza* Hendel

Dizygomyza Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 83, 1951.

Of the six described species of this subgenus two are Nearctic and four are Holarctic. The adults placed in this subgenus are characterized by a very large lunule. The lunule is in the plane of the frontal vitta and abruptly raised above the plane of the mesofacial plate (fig. 83). This is in contrast to subgenus *Poëmyza* where the lunule is sunken somewhat below the frontal vitta and is in the plane of the mesofacial plate (fig. 78). The height of the lunule is usually less than one-half its width at the antennal bases. However, the lunule may be higher (fig. 83), as it is in *Phytobia* (*Dizygomyza*) *thompsoni,* but the lunule being in the plane of the frontal vitta separates the latter species from species of the subgenus *Poëmyza.* Subgenus *Dizygomyza* has the frontal triangle no larger than the ocellar triangle (fig. 83), in contrast to the elongate frontal triangle found in subgenus *Icteromyza* which reaches to the lunule (fig. 85). The third antennal segment of the males is greatly enlarged. The larvae have three bulbs on each posterior spiracle. One or more of these is usually elongate, heavily sclerotized, acuminate, and variously curved. The posterior spiracles of some species are quite similar to some found in subgenus *Poëmyza.*

Key to the described species of *Phytobia* (*Dizygomyza*)

1. Anterior half of mesonotum with acrostichal setae numerous, in six to eight irregular rows 2
   Anterior half of mesonotum with acrostichals relatively sparse, in four to five irregular rows 4
2. Legs with all femora distally light yellow for a distance subequal to the femoral diameter 3
   Legs with forefemur distally light yellow, others light brown . . . . . **iridis**
3. Head rounded in profile, genovertical plates at most barely extending beyond eye margin; tarsi dark brown; small species, two to 2.3 mm. in wing length. **iracos**
   Head subtriangular in profile, genovertical plates strongly extending beyond eye margin (fig. 82); tarsi yellowish; large species, 2.75 to 3.0 mm. in wing length . . . . . **thompsoni**

4. Legs with all femora distally light yellow for a distance subequal to the femoral diameter 5
Legs with forefemur distally light yellow, others black . . . . . **luctuosa**
5. Abdomen with basal two or three tergites laterally yellow . . . . . **morosa**
Abdomen with basal two or three tergites laterally black . . . **magnicornis**

***Phytobia* (*Dizygomyza*) *iraeos* (Robineau-Desvoidy)**

Agromyza iraeos Robineau-Desvoidy, Rev. Mag. Zool., ser. 2, vol. 3, p. 393, 1851.

Dizygomyza (*Dizygomyza*) *iraeos* (Robineau-Desvoidy), Hendel, Die Fliegen der palaearktischen Region, fam. 59, p. 86, 1931 (figures of larval spiracles).

Agromyza taeniola (Coquillett), Melander (part), Journ. New York Ent. Soc., vol. 21, p. 256, 1913 (1 ♀, Douglas, Alaska).

This species is very similar to *Phytobia* (*Dizygomyza*) *iridis*, another Holarctic species, but may be separated by the three light yellow "knees." The key characters of rounded head, dark tarsi, and small size serve to separate this species from *P.* (*D.*) *thompsoni*. The larvae mine in *Iris* spp. There are reared specimens from Indiana and Louisiana; other specimens that I have seen are from Michigan and Alaska.

***Phytobia* (*Dizygomyza*) *iridis* (Hendel)**

Dizygomyza iridis Hendel, Zool. Anz., vol. 69, p. 253, 1927.

This Holarctic species is very similar to *Phytobia* (*Dizygomyza*) *iraeos* but is distinguished by having only the forefemur light yellow distally, the others being light brown. The larvae mine in *Iris* spp. I have identified specimens from California and Michigan.

***Phytobia* (*Dizygomyza*) *luctuosa* (Meigen)**

Agromyza luctuosa Meigen, Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten, vol. 6, p. 182, 1830.

Dizygomyza (*Dizygomyza*) *luctuosa* (Meigen), Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 88, 1931 (figures of head, wing, and puparial spiracles).

Agromyza taeniola (Coquillett), Melander (part), Journ. New York Ent. Soc., vol. 21, p. 256, 1913 (2 ♀ ♀, Portland, Oreg., and Monroe, Wash.).

A rather distinctive species among the species having relatively sparse acrostichals in that the midfemora and hind femora are all black. No reared specimens are known from North America, but the larvae mine species of *Carex* and *Juncus* in Europe. At present this species is known from California, Oregon, Washington, and New York, in the United States, and from Nova Scotia in Canada.

***Phytobia* (*Dizygomyza*) *magnicornis* (Loew)**

Agromyza magnicornis Loew, Berliner Ent. Zeitschr., vol. 13, p. 46, 1869 (Centuria VIII, No. 86).

This is a Nearctic species that may be separated from the closely related *Phytobia* (*Dizygomyza*) *morosa* in having the abdominal ter-

gites laterally black or brown; the basal two or three tergites of *P.* (*D.*) *morosa* are laterally yellow. The head (fig. 80) and wing (fig. 81) of the holotype male are illustrated in order to help identify this previously misidentified species. The larval host plants are not known. I have seen specimens from Illinois, Indiana, Michigan, District of Columbia, Pennsylvania, and New Hampshire as well as from British Columbia.

***Phytobia* (*Dizygomyza*) *morosa* (Meigen)**

Agromyza morosa Meigen, Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten, vol. 6, p. 170, 1830.

Dizygomyza (*Dizygomyza*) *morosa* (Meigen), Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 90, 1931 (figures of head and puparial spiracles).

Another Holarctic species that is little known in North America. It is distinctive in having the basal two or three tergites yellow laterally. No larval host plants are known in North America but the larvae mine in species of *Scirpus* and *Carex* in Europe. Thus far known only from South Dakota, Illinois, Indiana, and Maryland.

***Phytobia* (*Dizygomyza*) *thompsoni* Frick**

Agromyza magnicornis (Loew), Coquillett, *in* Thompson, Psyche, vol. 14, p. 74, 1907 (figure of leaf galls).

Agromyza laterella (Zetterstedt), Malloch (part), Ann. Ent. Soc. Amer., vol. 6, p. 300, 1913.—Claassen, Ann. Ent. Soc. Amer., vol. 11, p. 9, 1918 (figures of adult, puparium, larva, and leaf mines and galls).

This is a large species (2.75 to 3 mm. in wing length) for a species of the subgenus *Dizygomyza*. The head is subtriangular in profile with the genovertical plates strongly extending beyond the eye margin (fig. 82). The lunule is high for this subgenus, extending halfway to the anterior ocellus from the antennal base (fig. 83). The male terminalia is characterized by the large yellow knob on the ninth tergite (fig. 84). The larvae mine the leaves of *Iris versicolor* L., *Iris* sp. (blue flag), and *Typha* spp. There are specimens from Illinois, Michigan, Pennsylvania, New York, and Massachusetts.

5g. Subgenus *Icteromyza* Hendel

Icteromyza Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 51, 1931.

The adults are characterized by the bright yellow frontal vitta and lunule, the elongate frontal triangle reaching to the lunule, the very large lunule that is in the plane of the frontal vitta and abruptly raised above the mesofacial plate, and the widely spaced antennal bases (fig. 85). This subgenus may be separated from subgenus *Poëmyza* by the bright yellow frontal vitta and the lunule in the plane of the frontal vitta and from subgenus *Dizygomyza* by the color of

the frontal vitta and the elongate frontal triangle. The third antennal segment of the males is not enlarged. The eye may be setulose, as it is in *Phytobia* (*Icteromyza*) *pollinosa* (fig. 87). The wing is relatively long and slender (fig. 86) as compared to the wings in the subgenera *Phytobia* (fig. 60), *Poëmyza* (fig. 77), and *Dizygomyza* (fig.81). The larva of *Phytobia* (*Icteromyza*) *longipennis* is the only one known from the subgenus. The anterior spiracle has two small bulbs and is very small. Each posterior spiracle of the third stage or full grown larva is long, ventrally directed, sclerotized, acuminate, and bears about 20 very small bulbs in a single row. Such a highly modified spiracle compares favorably with the unusual and diverse types found in the subgenera *Poëmyza* and *Dizygomyza* and supports the close relationship shown by the adults of the three subgenera.

Key to the described species of *Phytobia* (*Icteromyza*)

1. Maxillary palpus yellow; femora distally broadly yellow for a distance subequal to one-third the femoral length 2
   Maxillary palpus black; femora distally narrowly yellow for a distance subequal to the femoral diameter . . . . . **capitata**
2. Eye setulose; third antennal segment yellow. . . . . **pollinosa**
   Eye practically bare; third antennal segment mostly brown or black. **longipennis**

***Phytobia* (*Icteromyza*) *capitata* (Zetterstedt)**

Agromyza capitata Zetterstedt, Diptera Scandinaviae, vol. 7, p. 2750, 1848.
Dizygomyza (*Icteromyza*) *capitata* (Zetterstedt), Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 52, 1931 (figures of head and wing).—de Meijere, Tijdschr. Ent., vol. 84, p. 15, 1941.
Agromyza genualis Melander, Journ. New York Ent. Soc., vol. 21, p. 261, 1913.
Agromyza coloradensis Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 297, 1913.

This Holarctic species is large, with a wing length of 2.5 to 3.5 mm. The maxillary palpus is black and the femora are distally yellow for a distance equal to the femoral diameter. A front view of the head shows the form of the lunule and frontal triangle (fig. 85). De Meijere found an adult of this species on the stems of *Juncus* sp. and surmised that the larvae mined in *Juncus* spp. *Dizygomyza* (*Icteromyza*) *capitata* is northern in distribution but extends down the Sierra Nevada mountain chain into southern California. It also occurs in Oregon, Washington, Idaho, Montana, Utah, Colorado, North Dakota, Michigan, Illinois, Maine, and Ontario.

***Phytobia* (*Icteromyza*) *longipennis* (Loew)**

Agromyza longipennis Loew, Berliner Ent. Zeitschr., vol. 13, p. 48, 1869 (Centuria VIII, No. 90).—Melander, Journ. New York Ent. Soc., vol. 21, p. 255, 1913.—Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 296, 1913.

This species is smaller (2.5 mm. in wing length) than *Phytobia* (*Icteromyza*) *capitata*, has the palpus yellow, and all femora distally

broadly yellow for about one-third the length. From *P.* (*I.*) *pollinosa* it differs by having the third antennal segment brown or black and the eye bare. The wing is typical of those found in this subgenus in being relatively long and narrow (fig. 86). I have reared *P.* (*I.*) *longipennis* from leaf and stem mines in *Juncus xiphioides* Meyer in California. This is the first positive record of a host plant for species of the subgenus *Icteromyza*. I have seen specimens from many States throughout the United States and from Manitoba and Quebec in Canada.

***Phytobia* (*Icteromyza*) *pollinosa* (Melander)**

Agromyza pollinosa Melander, Journ. New York Ent. Soc., vol. 21, p. 263, 1913.

The eyes are heavily pollinose (fig. 87), a character which separates this species from other North American species. It is closest to *Phytobia* (*Icteromyza*) *longipennis* in having the palpus yellow and the distal third of the femora yellow, but it has the third antennal segment yellow. There are only two known specimens, both from Sikta, Alaska.

5h. Subgenus *Calycomyza* Hendel

Calycomyza Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 65, 1931.—Frick, Ann. Ent. Soc. Amer., vol. 49, p. 284, 1956 (figures of larval characters and types of leaf mines of five species).

This subgenus is placed among the more specialized subgenera on the basis of the usual lack of a presutural dorsocentral and the circular or irregular form of the posterior spiracles of two of the six described larvae. The species found north of Mexico were recently revised by Frick (1956b). Previously, species of the subgenus *Calycomyza* were distinguished by the three postsutural dorsocentral setae and the black legs. A number of North American species were described in which the forefemur is distally narrowly yellow and two—*Phytobia* (*Calycomyza*) *majuscula* and *P.* (*C.*) *gigantea*—that have four postsutural and none to three presutural dorsocentrals. *P.* (*C.*) *meridiana* has the third antennal segment yellow, a unique character for this subgenus. The larvae of only six species are known. There are usually three bulbs on each posterior spiracle but one Palaearctic species has from three to five while one Nearctic species has five to eight in a circle and one Holarctic species has about 10 irregularly arranged.

The large number of species found in North America was surprising considering that only five are known in the well-collected Palaearctic region. Of the 17 species described from North America, three are Holarctic, three others are found in both Nearctic and Neotropical regions, eight are strictly Nearctic, and four are Neotropical only.

The revision did not include species found south of the United States because of the poor condition of the type series of *P.* (*C.*) *ipomoeae* and *P.* (*C.*) *cassiae*. Complete descriptions are impossible and these species are placed in the key by using rather minor characters. Short descriptions are included for the three Neotropical species not included in the revision. The notes under the other species are limited to larval host plant records and distributions because the revision included descriptions of all species considered therein.

Key to the described species of *Phytobia* (*Calycomyza*)

1. Calypter with margin and fringe white or yellow 2
   Calypter with margin and fringe dark brown or black 6
2. Third antennal segment rounded, subcircular; anterior half of mesonotum with about six rows of acrostichal setae 3
   Third antennal segment with an anterodorsal angle, flattened dorsally beyond base of arista; about five rows of acrostichals 5
3. Genovertical plates dark from vertex to at least the dorsal upper-orbital seta; forefemur entirely black 4
   Genovertical plates dark not more than halfway between inner vertical seta and dorsal upper-orbital; forefemur distally narrowly yellow. **lantanae**
4. Second dorsocentral seta more than one-half the length of the third dorsocentral; genovertical plates dark from vertex to at least halfway between the two upper-orbital setae . . . . . **promissa**
   Second dorsocentral one-half or less the length of the third; genovertical plates dark usually to dorsal upper-orbital, sometimes beyond, rarely to ventral upper-orbital . . . . . **jucunda**
5. Mesofacial plate dark except for narrow yellow epistomal margin; calypter with margin and fringe white . . . . . **humeralis**
   Mesofacial plate yellow; margin and fringe yellow . . . . . **solidaginis**
6. Mesofacial plate at least one-half dark 7
   Mesofacial plate yellow, not more than antennal bases dark 10
7. Genovertical plates dark from vertex to at least ventral upper-orbital . . 8
   Genovertical plates dark from vertex to dorsal upper-orbital . **artemisiae**
8. Genovertical plates dark, at least narrowly, from vertex to the ventral lower-orbital; second dorsocentral more than one-half the length of the third dorsocentral 9
   Genovertical plates dark to ventral upper-orbital or dorsal lower-orbital; second dorsocentral less than one-half the third . . . . . **cynoglossi**
9. Mesonotum shining, six rows of acrostichals; humeral seta on black. **majuscula**
   Mesonotum dull, pollinose, four or five rows of acrostichals; humeral seta on yellow . . . . . **gigantea**
10. Genovertical plates yellow, rarely dark from vertex to halfway to dorsal upper-orbital; third antennal segment ovoid, longer than wide 11
    Genovertical plates dark at least to dorsal upper-orbital; third antennal segment subcircular 12
11. Inner postalar seta on yellow of mesonotum . . . . . **flavinotum**
    Inner postalar on black of mesonotum . . . . . **allecta**

12. Third antennal segment black 13
Third antennal segment yellow . . . . . **meridiana**
13. Genovertical plates dark from vertex to at least the ventral upper-orbital . 14
Genovertical plates dark from vertex to dorsal upper-orbital 15
14. Arista subequal in length to the eye height; mesonotum with about 19 setulae in the intraalar row posterior to the transverse suture . . . . **cassiae**
Arista not more than four-fifths of the eye height; about 16 setulae in the intraalar row . . . . . **malvae**
15. Forefemur brown or black, at most lighter brown distally 16
Forefemur distally yellow for a distance subequal to the femoral diameter. **ipomoeae**
16. Frontal vitta relatively wide, not more than 1.4 times as high as wide. **ambrosiae**
Frontal vitta relatively narrow, not less than 1.7 times as high as wide. **verbenae**

Phytobia (*Calycomyza*) *allecta* (Melander)

Agromyza lateralis Williston, (not Macquart, 1835), Trans. Ent. Soc. London, 1896, pt. 3, p. 428, 1896 (figure of head).

Phytobia (*Calycomyza*) *allecta* (Melander), Frick, Ann. Ent. Soc. Amer., vol. 49, p. 298, 1956.

The larvae have elongate anal lobes and form large blotch mines in the leaves of *Bidens frondosa* L., *Helianthus* spp., and *Rudbeckia* spp. The species occurs east of the Rocky Mountains in the United States and Canada and on the islands of St. Vincent, Haiti, and Puerto Rico in the West Indies.

Phytobia (*Calycomyza*) *ambrosiae* Frick

Phytobia (*Calycomyza*) *ambrosiae* Frick, Ann. Ent. Soc. Amer., vol. 49, p. 299, 1956.

This species has been reared from *Ambrosia artemisiifolia* L. and *A. trifida* L. Thus far it has been found in Indiana, Tennessee, and Florida.

Phytobia (*Calycomyza*) *artemisiae* (Kaltenbach)

Agromyza artemisiae Kaltenbach, Verh. Naturh. Ver. Preuss. Rheinlande Westfalens, vol. 13, p. 236, 1856.

Dizygomyza (*Calycomyza*) *artemisiae* (Kaltenbach), Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59. p. 66, 1931 (figures of head, wing, and puparium).

Phytobia (*Calycomyza*) *artemisiae* (Kaltenbach), Frick, Ann. Ent. Soc. Amer., vol. 49, p. 294, 1956 (figures of larval characters and leaf mines).

The larvae of this Holarctic species make blotch mines in the leaves of *Artemisia* spp. and *Rudbeckia* spp. in North America. The species appears to be generally distributed over the United States and Canada. It is known from Guatemala.

***Phytobia* (*Calcomyza*) *cassiae* (Frost)**

Agromyza sp., Frost, Sci. Month., vol. 30, p. 445, 1930 (figure of leaf mines).
Agromyza cassiae Frost, Ann. Ent. Soc. Amer., vol. 29, p. 306, 1936.

The holotype female is in the U. S. National Museum (No. 62965). *Phytobia* (*Calycomyza*) *cassiae* is very similar to *P.* (*C.*) *malvae* and, because the type series is in poor condition, separation of the two species is difficult. The very long arista, subequal in length to the eye height, is probably the best character to use at this time. The larvae make serpentine mines in the leaves of *Cassia bacillaris* L. The type series is from the Panama Canal Zone and I have identified two specimens from Puerto Rico as belonging to *Phytobia* (*Calycomyza*) *cassiae*.

***Phytobia* (*Calycomyza*) *cynoglossi* Frick**

Phytobia (*Calycomyza*) *cynoglossi* Frick, Ann. Ent. Soc. Amer., vol. 49, p. 295, 1956.

The larvae mine the leaves of *Cynoglossum* spp. This species is general throughout Canada but is not known west of Kansas in the United States.

***Phytobia* (*Calycomyza*) *flavinotum* Frick**

Agromyza allecta (Melander), Frost (part), Mem. Cornell Univ. Agr. Exp. Sta., vol. 78, p. 38, 1924.
Phytobia (*Calycomyza*) *flavinotum* Frick, Ann. Ent. Soc. Amer.. vol. 49, p. 297, 1956 (figure of antenna).

This is a distinctive species in that the inner postalar seta is on yellow. The larvae have elongate anal lobes and make large blotch mines in the leaves of *Arctium lappa* L., *Eupatorium purpureum* L., and *Viburnum pubescens* Pursh.

***Phytobia* (*Calycomyza*) *gigantea* Frick**

Agromyza platyptera (Thomson), Malloch (part), Ann. Ent. Soc. Amer., vol. 6, p. 293, 1913.
Phytobia (*Calycomyza*) *gigantea* Frick, Ann. Ent. Soc. Amer., vol. 49, p. 296, 1956.

This is the largest species (1.75–2.5 mm. in wing length) known in the subgenus. The larval host plants are unknown. This species is recorded in the United States from Illinois, Virginia, Maryland, and in Canada from Ontario and from Quebec.

***Phytobia* (*Calycomyza*) *humeralis* (von Roser)**

Agromyza humeralis von Roser, Korresp.-Blatt. Wuertt. Landw. Ver., vol. 8, p. 63, 1840.
Phytobia (*Calycomza*) *humeralis* (von Roser), Frick, Ann. Ent. Soc. Amer., vol. 49, p. 290, 1956 (figures of antenna, larval characters, and leaf mines).

The larvae are unique in having eight to ten bulbs in the posterior spiracles. Many larval host plants in the Compositae are known

both in Europe and the United States. Frick (1956b) reported the larvae mining *Penstemon procerus* Dougl., family Scrophulariaceae, in California. The species is widely distributed in the United States and Canada.

***Phytobia* (*Calycomyza*) *ipomoeae* (Frost)**

Agromyza ipomaeae Frost, Ent. News, vol. 42, p. 74, 1931.

The type series is teneral and therefore rather difficult to characterize fully. However, the forefemur is distally yellow for a distance subequal to its diameter and the midfemora and hindfemora are reddish distally. These characteristics separate *Phytobia* (*Calycomyza*) *ipomoeae* from *P.* (*C.*) *ambrosiae* and *P.* (*C.*) *verbenae.* The larvae mine the leaves of *Ipomoea batatas* Poir. in Puerto Rico.

***Phytobia* (*Calycomyza*) *jucunda* (van der Wulp)**

Agromyza jucunda van der Wulp, Tijdschr. Ent., vol. 10, p. 161, 1867.
Phytobia (*Calycomyza*) *jucunda* (van der Wulp), Frick, Ann. Ent. Soc. Amer., vol. 49, p. 288, 1956 (figures of larval characters and leaf mines).
Agromyza platyptera Thomson, Diptera, *in* Kongliga Svenska Fregatten *Eugenies* . . . , vol. 6, pt. 2, p. 608, 1868.
Agromyza coronata Loew, Berliner Ent. Zeitschr., vol. 13, p. 48, 1869 (Centuria VIII, No. 89).

This species is Nearctic in distribution and is commonly found throughout the United States and Canada. The larvae mine the leaves of a rather large number of plants in the family Compositae.

***Phytobia* (*Calycomyza*) *lantanae* Frick**

Phytobia (*Calycomyza*) *lantanae* Frick, Ann. Ent. Soc. Amer., vol. 49, p. 287, 1956.

The larvae mine the leaves of *Lantana camara* L., possibly other *Lantana* spp., and *Lippia helleri* Britt. This is a Neotropical species known from southern Texas, Mexico, Puerto Rico, and Trinidad.

***Phytobia* (*Calycomyza*) *majuscula* Frick**

Phytobia (*Calycomyza*) *majuscula* Frick, Ann. Ent. Soc. Amer., vol. 49, p. 295, 1956 (figures of larval characters and leaf mines).

This is a moderately large species, the larvae of which make blotch mines in the leaves of *Senecio lugens* var. *exaltatus* Gray in central California. Also known from Washington, Idaho, Saskatchewan, and Ontario.

***Phytobia* (*Calycomyza*) *malvae* (Burgess)**

Oscinis malvae Burgess, U. S. Dep. Agr. Ann. Rep. (1879), p. 202, 1880.
Phytobia (*Calycomyza*) *malvae* (Burgess), Frick, Ann. Ent. Soc. Amer., vol. 49, p. 298, 1956.
Agromyza jucunda (Van der Wulp), Coquillett (part), U. S. Dep. Agr., Div. Ent. Bull. 10, p. 77, 1898.
Agromyza cassiae Frost (part), Ann. Ent. Soc. Amer., vol. 29, p. 306, 1936.

The larvae mine the leaves of the following malvaceous plants: *Malva rotundifolia* L., *Abutilon theophrasti* Medic., *Althaea* sp., *Malvastrum coromandelianum* L., and *Sida spinosa* L. The species has been collected in scattered locations throughout the United States and from the Panama Canal Zone.

Phytobia (*Calycomyza*) *meridiana* (Hendel)

Agromyza meridionalis Malloch (not Strobl, 1900), Trans. Amer. Ent. Soc., vol. 40, p. 35, 1914.

Agromyza meridiana Hendel, Konowia, vol. 2, p. 145, 1923.

This species is unique among species of the subgenus *Calycomyza* in having the third antennal segment yellow. No larval host plants are known. I have seen specimens from Costa Rica and Mexico.

Phytobia (*Calycomyza*) *promissa* Frick

Phytobia (*Calycomyza*) *jucunda* (van der Wulp), Frick (part), Univ. California Publ. Ent., vol. 8, p. 395, 1952.

Phytobia (*Calycomyza*) *promissa* Frick, Ann. Ent. Soc. Amer., vol. 49, p. 287, 1956 (figures of antenna, larval characters, and leaf mines).

This species was described from linear-blotch mines in the leaves of *Aster chilensis* Nees in central California. Several specimens from Manitoba and Ontario were placed under this name because the only observable difference was the slightly larger size.

Phytobia (*Calycomyza*) *solidaginis* (Kaltenbach)

Agromyza solidaginis Kaltenbach, Verh. Naturh. Ver. Preuss. Rheinlande Westfalens, vol. 26, p. 196, 1869.

Phytobia (*Calycomyza*) *solidaginis* (Kaltenbach), Frick, Ann. Ent. Soc. Amer., vol. 49, p. 292, 1956.

The larvae mine the leaves of *Solidago* spp. Found throughout the United States, eastern Canada, and Europe.

Phytobia (*Calycomyza*) *verbenae* (Hering)

Agromyza jucunda (van der Wulp), Coquillett (part), U. S. Dep. Agr., Div. Ent. Bull. 10, p. 77, 1898.

Dizygomyza (*Calycomyza*) *verbenae* Hering, Notulae Ent., vol. 31, p. 42, 1951.

Phytobia (*Calycomyza*) *verbenae* (Hering), Frick, Ann. Ent. Soc. Amer., vol. 49, p. 300, 1956.

The larvae mine the leaves of *Verbena* spp. in the southwestern and eastern United States. The species appears to be common.

5i. Subgenus *Trilobomyza* Hendel

Trilobomyza Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 71, 1931.

This is a small subgenus that contains three described Nearctic species. It is characterized by the genal height not exceeding one-third

that of the eye (fig. 90), two upper-orbital setae (fig. 89), the lunule low, and the genovertical plates not abruptly raised above the frontal vitta (fig. 88) as they are in species of the subgenus *Praspedomyza* (fig. 92). The frontal vitta is usually yellow but when it is dark the abdomen is also dark. A small pair of prescutellar setae may be present. The larvae have three short recurved bulbs on each posterior spiracle. The subgenus *Trilobomyza* is placed among the more specialized subgenera because of the similarity of the adults to those of the subgenus *Praspedomyza*.

One diverse species, *Phytobia* (*Trilobomyza*) *pleuralis*, is included here although it is an example of one that belongs strictly to no one subgenus. However, the adults have more characters in common with species of the subgenus *Trilobomyza* than with species in the other subgenera.

Key to the described species of *Phytobia* (*Trilobomyza*)

1. Frontal vitta yellowish; femora yellow 2
   Frontal vitta black; femora dark brown . . . . . **calyptrata**
2. Mesonotum with four dorsocentrals; anepisternum brown, dorsally about one-fourth yellow . . . . . **varia**
   Mesonotum with three postsutural dorsocentrals; anepisternum yellow. **pleuralis**

***Phytobia* (*Trilobomyza*) *calyptrata* (Hendel)**

Agromyza nigrisquama Malloch (not Malloch, 1914), Psyche, vol. 23, p. 53, 1916.
Agromyza calyptrata Hendel, Konowia, vol. 2, p. 145, 1923.

This species may be separated from others in the subgenus *Trilobomyza* by the over-all dark brown coloration, particularly that of the frontal vitta and the femora. The head is illustrated to show the subcircular eye (fig. 89). The holotype from Illinois is the only specimen that I have seen.

***Phytobia* (*Trilobomyza*) *pleuralis* (Malloch)**

Agromyza pleuralis Malloch, Ent. News, vol. 25, p. 311, 1914.
Agromyza clara (Melander), Frost, Mem. Cornell Univ. Agr. Exp. Sta., vol. 78, p. 41, 1924.

Frick (1953a) discussed the subgeneric position of this atypical species, which has more characters in common with subgenus *Trilobomyza* than with any other subgenus. The head has the gena relatively wide (fig. 90). The larvae form serpentine-blotch mines in the leaves of *Catalpa* spp. At present the known distribution is limited to Illinois and Ohio.

***Phytobia* (*Trilobomyza*) *varia* (Melander)**

Agromyza varia Melander, Journ. New York Ent. Soc., vol. 21, p. 264, 1913.

This species is typical of those in the subgenus *Trilobomyza* in having yellow frons and femora. The head bears only one lower-orbital (fig. 91) and is of a much different shape than that of *Phytobia* (*Trilobomyza*) *pleuralis* (fig. 90). The dark area on the anepisternum and the four strong dorsocentral setae also serve to separate *P.* (*T.*) *varia* from *P.* (*T.*) *pleuralis*. The holotype and only known specimen is from Idaho.

5j. Subgenus *Praspedomyza* Hendel

Praspedomyza Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 77, 1931.

This subgenus is considered the most specialized because of the form of the posterior spiracles of the larvae. Each is circular and bears from 10 to 18 short bulbs. The adults are very similar to those in the subgenus *Trilobomyza* but may be separated by the broad prominent genovertical plates. These are distinctly above the plane of the frontal vitta and are abruptly raised above it (fig. 92). The adults are usually dark and may be distinguished from the dark *Phytobia* (*Trilobomyza*) *calyptrata* by the aforementioned genovertical plates.

There are only two species in North America that belong to the subgenus *Praspedomyza* sens. str. One, *Phytobia* (*Praspedomyza*) *morio*, is Holarctic while *Phytobia (Praspedomyza) subinfumata* is Nearctic. *Phytobia (Praspedomyza) clara* is included here only because the posterior spiracles of the larvae each have 10 to 12 bulbs arranged in a circle. The adults are yellow and the gena is extremely wide, being nearly two-thirds as high as the eye (fig. 93). The Nearctic *Phytobia clara* and Palaearctic *P. hilarella* are very similar species that are not closely related to other *Phytobia* species. The larvae of both mine the fronds of *Pteridium aquilinum* (L.) Kuhn.

Key to the described species of *Phytobia* (*Praspedomyza*)

1. Frontal vitta brown or black; femora primarily brown 2
   Frontal vitta yellow; femora yellow . . . . . **clara**
2. Head with three or four lower-orbital setae; femora brown . . **subinfumata**
   Head with two lower-orbital setae; femora brown except for forefemur being narrowly yellow distally . . . . . **morio**

***Phytobia* (*Praspedomyza*) *clara* (Melander)**

Agromyza clara Melander, Journ. New York Ent. Soc., vol. 21, p. 265, 1913.
Agromyza citreifrons Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 290, 1913.

This is a small (1.3 to 1.75 mm. in wing length) yellowish species that contrasts strongly with the predominately dark species typical

of the subgenus *Praspedomyza*. *Phytobia hilarella*, a very similar species, was placed into *Praspedomyza* by Hendel because of larval characters. *Phytobia clara* is retained here for the same reason although the demarcation between the frontal vitta and the genovertical plates is not as clearly defined as it is in most species of the subgenus *Praspedomyza*. I have illustrated the head (fig. 93) to show the contrast between *Phytobia clara* and *P. hilarella*, the latter figured by Hendel (1931). The larvae form mines in the fronds of *Pteridium aquilinum* (L.) Kuhn. I have seen specimens from California, Washington, Michigan, Tennessee, and Maine in the United States and from Ontario, Canada.

***Phytobia* (*Praspedomyza*) *morio* (Brischke)**

Agromyza morio Brischke, Schrift. Naturf. Ges. Danzig, vol. 5, p. 258, 1881.
Dizygomyza (*Praspedomyza*) *morio* (Brischke), Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 80, 1931 (figures of head and wing).

This is a small black species that has the third antennal segment and the forefemur distally yellow. Malloch had a Maryland specimen in the U. S. National Museum labeled "*A. luteicornis* Malloch MS." I have reared the species from *Galium trifidum* L. and *G. aparine* L. in California. No other North American specimens are known.

***Phytobia* (*Praspedomyza*) *subinfumata* (Malloch)**

Agromyza infumuta Malloch, (not Czerny and Strobl, 1909), Canadian Ent., vol. 47, p. 15, 1915.
Agromyza subinfumata Malloch, Proc. U. S. Nat. Mus., vol. 49, p. 108, 1915.

This species is dark brown and lacks the yellow third antennal segment and distally yellow forefemur of *Phytobia morio*. The head has the genovertical plates extending beyond the eye margin and bearing three or four lower-orbital setae (fig. 94). Known only from Illinois.

6. Genus *Cerodontha* Rondani

Cerodontha Rondani, Dipt. Ital. Prodr., vol. 4, p. 10, 1861.

This is a relatively small genus that is characterized by having only the distal pair of scutellar setae present (fig. 95). The third antennal segment is always angulate distally. Two widely divergent subgenera have been recognized. One, the subgenus *Xenophytomyza*, could be very properly placed as a synonym of *Phytobia* (*Praspedomyza*) except for the two scutellar setae and the *Cerodontha* (*Cerodontha*) type of male terminalia.

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Key to the subgenera of *Cerodontha*

1. Third antennal segment distally bearing a spine or strongly projecting into a very acute angle; thorax and abdomen partially yellow. **6a. Cerodontha**
   Third antennal segment with a blunt angle distally; thorax and abdomen shining brown or black . . . . . **6b. Xenophytomyza**

6a. Subgenus *Cerodontha* Rondani

Cerodontha Rondani, Dipt. Ital. Prodr., vol. 4, p. 10, 1861.

The adults placed in this subgenus are relatively slender and elongate and the body is always partially yellow. The third antennal segment either bears a spine or is produced distally into a very acute angle. Crossvein m-m is always present. There are eight species recognized in Europe but only one in North America.

Cerodontha (*Cerodontha*) *dorsalis* (Loew)

Odontocera dorsalis Loew, Berliner Ent. Zeitschr., vol. 7, p. 54, 1863 (Centuria III, No. 98).

Cerodontha dorsalis (Loew), Melander, Journ. New York Ent. Soc., vol. 21, p. 249, 1913 (figure of head) (east of Rocky Mountains).—Aldrich, Ann. Ent. Soc. Amer., vol. 11, p. 63, 1918.

Cerodontha femoralis (Meigen), Melander, Journ. New York, Ent. Soc., vol. 21, p. 249, 1913 (Rocky Mountains, westward).

The type is in the Museum of Comparative Zoology (No. 13433). This species varies greatly in the proportions of yellow and black. Aldrich (1918) showed that the dark western form came from the region of cool nights and the more yellowish eastern form is from the region of warm nights. Spring and fall collections, during seasons of cool nights, produced the dark form in the east. Frick (1952) showed that the male terminalia were the same for both color forms. The mesonotum of the holotype female is illustrated to show the color pattern (fig. 95). The larvae mine the leaves of many grasses, pupating in the sheath. *Cerodontha dorsalis* is one of the most common and widespread species in the United States and Canada.

6b. Subgenus *Xenophytomyza* Frey

Xenophytomyza Frey, Notulae Ent., vol. 26, p. 51, 1946.—Frick, Kansas Ent. Soc., vol. 25, p. 150, 1952 (figure of head).

This subgenus contains three species, two Palaearctic and one Nearctic. The adults are robust and shining brown or black. The third antennal segment has a blunt angle distally in contrast to the very acute angle of the species of *Cerodontha* sens. str. Crossvein m-m is absent in one European species.

***Phytobia* (*Xenophytomyza*) *illinoensis* (Malloch)**

Agromyza illinoensis Malloch, Diptera of Patagonia and South Chile, pt. 6, fasc. 5, p. 483, 1934.

Cerodontha (*Xenophytomyza*) *illinoensis* (Malloch), Frick, Journ. Kansas Ent. Soc., vol. 25, p. 151, 1952 (figure of head).

A dark robust species having a blunt angle distally on the third antennal segment. It is most easily separated from the dark *Phytobia* species by the single pair of scutellar setae. It is known from swept specimens from Illinois and Virginia.

7. Genus *Liriomyza* Mik

Liriomyza Mik, Wiener Ent. Zeit., vol. 13, p. 289, 1894.

The genus *Liriomyza* is large, with 35 described North American species. Of these, 30 are Nearctic, four are Neotropical, and one is found in both regions. Six are Holarctic in distribution.

This genus is characterized by the partially or totally yellow scutellum, vein M_{1+2} being at or very near the wing tip (fig. 108), and the orbital setulae reclinate (fig. 107) or erect (fig. 110). There are usually numerous orbital setulae but they may be very sparse (fig. 112). Most of the species have some yellow on the head or body. There are a few that are as over-all dark as some species included in *Metopomyza*. The genovertical plates are narrower in *Liriomyza* species (the widest is shown in fig. 104). These plates are very broad throughout their full length in species of *Metopomyza* (fig. 128). There are no setae medially on the midtibia except for *Liriomyza braziliensis* (Frost) and *L. ecuadorensis* (Frost).

Although *Liriomyza* and *Haplomyza* appear to be separated on rather superficial characters in the key, the separation is justified by the two widely divergent types of male terminalia and larvae found in the two genera. Certain European species of *Liriomyza* have as many as three of the *Haplomyza* characters; e. g., if the mesonotum is heavily gray pollinose and there are two rows of acrostichals and only one upper-orbital, then crossvein m-m is present. In North America, two *Haplomyza* characters may occur together. As an example, *Liriomyza assimilis* has the mesonotum dull gray pollinose and has only two rows of acrostichals (fig. 99), but crossvein m-m is present and there are two upper-orbitals (fig. 98). Crossvein m-m is absent in *L. chlamydata* but the mesonotum is shining and bears four rows of acrostichals and there are two reclinate upper-orbitals.

Several unusual characters might be briefly mentioned here. The *sorosis* group is unusual in having either two postsutural dorsocentrals (fig. 111) or three with the third anterior to the supraalar seta and

the third and fourth at least two times as far apart as the second and third (fig. 124). The usual arrangement is for the third dorsocentral to be opposite or only slightly anterior to the supraalar with the third and fourth dorsocentrals about 1.5 times as far apart as the second and third (figs. 101, 120). *L. commelinae* is the only *Liriomyza* species known to me that has the third antennal segment of the male enlarged (fig. 102). This characteristic is found in all species of the subgenus *Dizygomyza* of *Phytobia*. *Liriomyza fumicosta* has the costal margin of the wing infuscated (fig. 108). Probably the most distinctive North American species that I have seen is *L. deceptiva*. The genovertical plates are very prominent and raised above the plane of the frontal vitta (fig. 104). Near the lunule these plates widen to equal about one-third of the width of the frons. The genovertical plates are proportionately broader for their full length in species of *Metopomyza* (fig. 128).

Besides the aforementioned *sorosis* group, three others, all within the *pusilla* complex, may be designated. These are based primarily on the colors of the vertex and genovertical plates (Frick, 1956a). The first may be called the *trifolii* group (couplet 34). Both vertical setae are on yellow and there are two rows of acrostichals. The second is the *eupatorii* group (couplet 29). Here the verticals arise from black, the genovertical plates are yellow, and there are four rows of acrostichals. The last group (couplet 27) contains *pictella* and is named for it. The genovertical plates being infuscated separate this group from that of *eupatorii*. The remaining species cannot be placed into groups because of wide differences between them.

Several species are herein deleted from the North American list. These include *L. pusilla* (Meigen) and *L. virgo* (Zetterstedt), neither of which I have seen in my studies. The South American *Agromyza xanthophora* (Schiner) apparently belongs to *Phytobia* (*Phytobia*) and may be the same as *P.* (*Phytobia*) *picta*. No type specimens of *A. xanthophora* can be located.

Key to the described species of *Liriomyza*

1. Mesonotum with a prescutellar yellow rectangular or triangular area between the dorsocentral setae extending anteriorly at least to the fourth dorsocentral (figs. 99, 101) 2
   Mesonotum without such a prescutellar yellow area but sometimes with a wide yellow crossband, centrally not extending to the fourth dorsocentral (figs. 103, 109) 16
2. Third antennal segment all or partially brown or black (figs. 115, 126) . . 3
   Third antennal segment yellow 6
3. Mesonotum subshining, not pollinose 4
   Mesonotum dull, gray pollinose 5

4. Mesonotum with inner postalar seta about one-third as long as outer postalar (fig. 120); one or two lower-orbital setae . . . . . **reverberata**
   Mesonotum with inner postalar subequal to outer; three lower-orbitals (fig. 126) . . . . . **variata**
5. Wing with costal area light brown from R_1 to R_{2+3} (fig. 108); scutellum without basal lateral black triangles (fig. 109) . . . . . **fumicosta**
   Wing with costal area colorless; scutellum with large black triangles, basal scutellar seta on black . . . . . **pacifica**
6. Mesonotum with three or four dorsocentral setae, the third strongly anterior to the supraalar seta, third and fourth at least two times as far apart as the second and third (figs. 111, 124) 7
   Mesonotum with four dorsocentrals, the third opposite or only slightly anterior to the supraalar, third and fourth about 1.5 times as far apart as the second and third (figs. 101, 113) 9
7. Mesonotum with dark area of two colors, either light reddish centrally with dark brown lateral stripes (fig. 111), or dark brown centrally and light reddish laterally 8
   Mesonotum with dark area uniformly dark brown or black (fig. 124) . **sorosis**
8. Mesonotum with three dorsocentrals, central area reddish brown, lateral stripes dark brown (fig.111) . . . . . **marginalis**
   Mesonotum with four dorsocentrals, central area black, lateral stripes light reddish . . . . . **barrocoloradensis**
9. Third antennal segment rounded 10
   Third antennal segment angulate dorsoanteriorly (fig. 96) . . **angulicornis**
10. Scutellum without basal lateral dark triangles 11
    Scutellum with basal lateral dark triangles (fig. 101) 12
11. Mesonotum dark brown; acrostichal setae in four rows, a small intraalar present, about twice as long as an acrostichal . . . . . **melampyga**
    Mesonotum light reddish brown; acrostichals in two rows; intraalar absent. **lutea**
12. Anepisternum with a dark oval or triangular area (fig. 100) 13
    Anepisternum entirely yellow . . . . . **schmidti**
13. Humerus with a dark area; width of gena posteriorly not more than one-half the eye height (fig. 98) 14
    Humerus entirely yellow; gena very wide, posteriorly subequal to the eye height . . . . . **borealis**
14. Maxillary palpus yellow 15
    Maxillary palpus brown . . . . . **tubifer**
15. Acrostichal setae about 13 in number, in four rows; prescutellar yellow area subrectangular . . . . . **flavonigra**
    Acrostichals five or six in number, in two rows; yellow area triangular (fig. 99) . . . . . **assimilis**
16. Third antennal segment totally dark brown or black, or if mostly yellow then darkened distally (fig. 126) 17
    Third antennal segment entirely light yellow 21
17. Wing with m-m crossvein present, or if absent, then mesiperon at least one-half yellow 18
    Wing with m-m crossvein absent; mesepimeron black . . . . **chlamydata**
18. Third antennal segment yellowish, infuscated distally 19
    Third antennal segment entirely black 20
19. Mesepimeron at least one-half yellow; pteropleuron about one-half yellow. **langei**
    Mesepimeron black; pteropleuron black or very dark grayish black . **dianthi**

20. Crossvein m-m about one-fourth of its length from r-m; distally femora brown. **quadrisetosa**
Crossvein m-m about twice its length from r-m; femora brown; distally yellow for a distance subequal to the femoral diameter . . . . . **baptisiae**
21. Anepisternum brown except for a narrow yellow dorsal band subequal in width to a suture 22
Anepisternum not more than three-fourths brown (fig. 116), dark area usually triangular 23
22. Genovertical plates yellow; inner vertical seta arising from yellow (fig. 106). **discalis**
Genovertical plates dark from vertex nearly to lunule; both vertical setae arising from black of occiput (fig. 104) . . . . . **deceptiva**
23. Femora primarily yellow, usually marked with brown or black streaks or spots 24
Femora dark brown, distal one-third yellow . . . . . **flaveola**
24. Calypter with margin and fringe blackish 25
Calypter with margin and fringe white . . . . . **lima**
25. Head with both vertical setae arising from black of occiput, inner usually at edge of dark color 26
Head with both vertical setae on yellow 31
26. Genovertical plates darkened between orbital setae and eye margin . . . 27
Genovertical plates yellow, concolorous with frontal vitta 29
27. Anepisternum at least one-half brown or black, dark area subrectangular . 28
Anepisternum less than one-half brown or black, dark area triangular. **brassicae**
28. Anepisternum about three-fourths dark (fig. 116); first dorsocentral seta small, subequal to an acrostichal in length and about one-fourth the fourth dorsocentral in length . . . . . **propepusilla**
Anepisternum about one-half dark; first dorsocentral larger, about one-third the length of the fourth dorsocentral . . . . . **pictella**
29. Crossvein m-m not more than its length from r-m; ultimate section M_{3+4} about three times as long as penultimate 30
Crossvein m-m 1.5 to two times its length from r-m; ultimate section M_{3+4} about two times as long as the penultimate . . . . . **eupatorii**
30. Inner postalar seta about one-half as long as the outer postalar; seven to nine setulae in the intraalar row posterior to the transverse suture . . **munda**
Inner postalar seta about one-fourth to one-third as long as the outer; about five setulae in the intraalar row posterior to the transverse suture. **verbenicola**
31. Mesonotum with four irregular rows of acrostichal setae 32
Mesonotum with two irregular rows of acrostichal setae 34
32. Humerus without a dark spot 33
Humerus with a dark spot . . . . . **alliovora**
33. Head with black of the occiput reaching to eye margin (fig. 107); anepisternum with a small dark ventral area . . . . . **felti**
Head with black of the occiput not reaching to eye margin (fig. 102); anepisternum entirely yellow . . . . . **commelinae**
34. Head with black of the occiput not reaching to eye margin; inner postalar seta on yellow 35
Head with black of the occiput reaching the eye margin; inner postalar seta on black . . . . . **trifolii**

35. Mesonotum dull, heavily gray pollinose; basal scutellar seta arising from black of lateral triangle . . . . . **allia**
Mesonotum subshining, not pollinose; basal scutellar seta arising from yellow, at edge of black triangle . . . . . **phaseolunata**

***Liriomyza allia* (Frost)**

Agromyza allia Frost, Journ. New York Ent. Soc., vol. 51, p. 257, 1943.
Liriomyza allia (Frost), Frick, Journ. Kansas Ent. Soc., vol. 28, p. 90, 1955 (figure of head).

The holotype male is in the U. S. National Museum (64300). This species varies from *Liriomyza alliovora* in having only two rows of acrostichals. *L. allia* has the mesonotum heavily gray pollinose in contrast to *L. trifolii* and *L. phaseolunata*, which are subshining and not pollinose. No larval host plants are known. In addition to the holotype there is a paratype male; both are from Manhattan, Kans.

***Liriomyza alliovora* Frick**

Liriomyza alliovora Frick, Journ. Kansas Ent. Soc., vol. 21, p. 88, 1955 (figure of head).

This species differs from *Liriomyza felti* and *L. commelinae* in having a dark spot on the humerus and from *L. allia* in having four rows of acrostichals. The head of *L. allivora* does not have the black from the occiput reaching the eye margin, as does *L. felti* (fig. 107), and the anepisternum has a ventral black area, unlike *L. commelinae*. The larvae mine the leaves of *Allium* sp. in Iowa.

***Liriomyza angulicornis* (Malloch)**

Agromyza angulicornis Malloch, Canadian Ent., vol. 50, p. 79, 1918.
Liriomyza angulicornis (Malloch), Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 208, 1931 (figure of head and wing).

This Holarctic species has the third antennal segment angulate dorsoanteriorly and the gena is about one-half as wide as the eye height (fig. 96). The anepisternum has a long slender ventral dark triangle (fig. 97). There are no known larval host plants. The holotype, from Illinois, is the only known North American specimen.

***Liriomyza assimilis* (Malloch)**

Agromyza assimilis Malloch, Canadian Ent., vol. 50, p. 80, 1918.

The head is entirely yellow in profile and both vertical setae are on yellow (fig. 98). The yellow prescutellar area is triangular in shape (fig. 99) and the dark ventral spot on the anepisternum is ovoid (fig. 100). Frost has a series of specimens reared from linear mines in the leaves of *Helianthus* sp. at Arendtsville, Pa. The holotype is from Illinois.

***Liriomyza baptisiae* (Frost)**

Agromyza baptisiae Frost, Canadian Ent., vol. 63, p. 275, 1931.

The holotype male is in the U. S. National Museum (No. 62962). The type series is in rather poor condition but this species belongs to those species that have the third antennal segment at least partially dark and lack the prescutellar yellow spot on the mesonotum. This is a small species (1.25 to 1.5 mm. in wing length) that has the third antennal segment totally black, the femera distally yellow, and the wing with crossvein m-m about twice its length from r-m. The larvae form linear-blotch mines in the leaves of *Baptisia tinctoria* (L.) in Pennsylvania.

***Liriomyza barrocoloradensis* (Frost)**

Agromyza barrocoloradensis Frost, Ann. Ent. Soc. Amer., vol. 29, p. 300, 1936.

The holotype male is in the U. S. National Museum (No. 62967). The head in profile is similar to that of *Liriomyza sorosis* (fig. 125). The mesonotum is shining and is marked much like that of *L. melampyga* (fig. 113) except that the marginal dark stripes are light reddish. The anepisternum is entirely yellow. The larvae mine the leaves of an unidentified plant in the Panama Canal Zone.

***Liriomyza borealis* (Malloch)**

Agromyza borealis Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 280, 1913 (figures of head and wing).

The head of the holotype is partially collapsed but posteriorly the gena is as wide as the eye is high. The maxillary palpus is yellow. The mesonotum is marked as in the figure and the basal pair of scutellar setae arises from yellow (fig. 101). This species is known only from the holotype from British Columbia.

***Liriomyza brassicae* (Riley)**

Agromyza brassicae Riley, U. S. Dep. Agr. Ann. Rep. (1884), p. 322, 1884.
Liriomyza brassicae (Riley), Frick, Pan-Pacific Ent., vol. 33, p. 68, 1957.
Agromyza diminuta (Walker), Coquillett (part), U. S. Dep. Agr., Div. Ent., Bull. 10, p. 78, 1898 (specimens from cabbage).
Phytomyza mitis Curran, Canadian Ent., vol. 63, p. 97, 1931.
Agromyza subpusilla Frost (part) (not Malloch, 1914), Journ. New York Ent. Soc., vol. 51, p. 255, 1943 (figure of mine of nasturtium leaf).

Liriomyza brassicae belongs to the group having yellow antennae, both varietal setae on the dark color of the vertex, and the genovertical plates darkened between the orbital setae and the eye margin. Of the three species in this group, *L. brassicae*, *L. propepusilla*, and *L. pictella*, the latter two have the anepisternum at least one-half dark, the dark area being subrectangular. The anepisternum of *L. brassicae* is subtriangular. The larvae mine the leaves of a large number of

cruciferous plants and *Tropaeolum* sp. (nasturtium). I have seen specimens from many of the States throughout the United States and from Manitoba in Canada. *Liriomyza brassicae* is also a well known species in Europe.

***Liriomyza chlamydata* (Melander)**

Antineura chlamydata Melander, Journ. New York Ent. Soc., vol. 21, p. 250, 1913.

This species belongs to the group without a prescutellar yellow spot on the mesonotum and with the third antennal segment partially dark. This species may be separated from the other three with a darkened third antennal segment by the lack of crossvein m-m. However, crossvein m-m is sometimes absent in *Liriomyza langei*, and *L. chlamydata* may be confused with those specimens of *L. langei* that lack the m-m crossvein. *L. chlamydata* may be separated by the setulae of the third antennal segment being as long as the basal diameter of the arista, six or seven very strong orbital setulae that are about one-fourth as long as the orbital setae, the humeral seta on black, and the black mesepimeron. The holotype and only known specimen is from the State of Washington.

***Liriomyza commelinae* (Frost)**

Agromyza commelinae Frost, Ent. News, vol. 42, pl 72, 1931.
Liriomyza commelinae (Frost), Silva and Oliveira, Rev. Brasil. Biol., vol. 12, p. 293, 1952 (figures of adult and larval characters and leaf mines).

The holotype male is in the U. S. National Museum (No. 62960). This species has the third antennal segment of the male greatly enlarged and the gena about one-third as wide as the eye height (fig. 102). The mesonotum is broadly yellow posteriorly but lacks a central rectangular or triangular area extending anteriorly of the fourth dorsocentral (fig. 103). The larvae form serpentine mines in the leaves of *Commelina elegans* H. B. K., *C. longicaulis* Jacq., and *C. virginica* L. I have seen specimens from St. Vincent and Trinidad in the British West Indies. This species is known from Brazil and apparently was redescribed by Blanchard (1954) as *L. bahamondesi*, from *Commelina virginica* L. in Argentina.

***Liriomyza deceptiva* (Malloch)**

Agromyza deceptiva Malloch, Canadian Ent., vol. 50, p. 78, 1918.

Liriomyza deceptiva is the most diverse North American species of *Liriomyza* known to me. The head is unique in having the genovertical plates broadened immediately above the antennae (fig. 104). In profile the head has the genovertical plates strongly extending beyond the eye margin (fig. 105). The pleura and abdomen are all black. There are two females that represent this species, one from Illinois and one from Virginia.

Liriomyza dianthi Frick

Liriomyza dianthi Frick, Proc. Ent. Soc. Washington, vol. 60, No. 1, p. 1, 1958 (figures of head and pleura).

This species is very black with relatively few yellow markings. It is similar to *Liriomyza quadrisetosa* and *L. baptisiae*, but differs in having the third antennal segment mostly yellowish and darkened distally. *L. dianthi* is very similar to *L. langei* but is darker over-all, having the mesepimeron and pteropleuron black or very dark grayish, the femora about three-fourths black, and the scutellum narrowly yellow with the distal scutellar setae being on the black triangles or not more than a setal base removed from them. *L. dianthi* is at present confined to the San Francisco Bay Area of California. The larvae make large white serpentine mines in the leaves of *Dianthus caryophyllus* L.

Liriomyza discalis (Malloch)

Agromyza discalis Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 277, 1913 (figure of head).

This is a very dark species of *Liriomyza* that has the pleura black except for the sutures. The head has the inner vertical seta on yellow and has a few sparse reclinate orbital setulae (fig. 106). The margin and fringe of the calypter are white. The holotype is from Arizona and is the only known specimen.

Liriomyze eupatorii (Kaltenbach)

Argromyza eupatorii Kaltenbach, Die Pfanzenfeinde aus der Klasse der Insekten, p. 320, 1874.

Liriomyza eupatorii (Kaltenbach), Frick, Canadian Ent., vol. 85, p. 72, 1953.

This is a Holarctic species that is little known in North America. It is close to *Liriomyza munda* and *L. verbenicola* in having the genovertical plates yellow. The most obvious distinction of *L. eupatorii* is crossvein m-m being 1.5 to 2 times its length from r-m, m-m being about at its own length in the other two species. The larvae make serpentine mines, usually beginning as a spiral, in *Solidago* spp., including *elongata* Nutt. in Washington. In Europe also found mining species of *Eupatorium*, *Lampsana*, and *Galeopsis*. Thus far found only in Washington.

Liriomyza felti (Malloch)

Agromyza felti Malloch, Ent. News, vol. 25, p. 310, 1914.—Frost, Mem. Cornell Univ. Agr. Exp. Sta., vol. 78, p. 43, 1924 (figures of leaf mines).

The holotype male is in the collection of the New York State Museum, Albany, N. Y. The head has the black of the occiput broadly reaching the eye margin and the eye is smoothly rounded anteriorly (fig. 107). This species differs from *Liriomyza commelinae* in having the gena centrally about one-fifth the eye height (about

one-third in *commelinae*) and in a small dark ventral spot on the anepisternum. The larvae make blotch mines in the leaves of the ferns *Camptosorus rhizophyllus* (L.) and *Asplenium pinnatifidum* Nutt. Known from Illinois and New York.

***Liriomyza flaveola* (Fallén)**

Argromyza flaveola Fallén, Diptera sueciae, vol. 2, No. 37 (Agromyzides), p. 6, 1823*
Liriomyza flaveloa (Fallén), Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 219, 1931 (figures of head and wing).
Agromyza scutellata (Fallén), Malloch (part), Ann. Ent. Soc. Amer., vol. 6, p. 280, 1913 (1, Dunoon, Scotland).

This species may be distinguished from the other species in the so-called *pusilla* complex by having the femora basally black for two-thirds of the length and yellow distally. The anepisternum is about one-half black with the dark area triangular. The abdomen is broadly yellow laterally. The larvae mine the leaves of grasses and I have reared it from *Bromus carinatus* H. & A., *Hordeum murinum* L., and *Lolium multiflorum* Lam. Thus far this Holarctic species is known in North America only from central California.

***Liriomyza flavonigra* (Coquillett)**

Agromyza flavonigra Coquillett, Journ. New York Ent. Soc., vol. 10, p. 189, 1902—Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 281, 1913 (figure of head).
Agromyza melampyga (Loew), Melander (part), Journ. New York Ent. Soc., vol. 21, p. 258, 1913 (1 ♂, New Mexico).

A rather large species (2.5 to 2.75 mm. in wing length) that has the genovertical plates extending beyond the eye margin. The mesonotum is dull but not pollinose and bears four developed dorsocentral setae, all on yellow. The abdomen is mostly yellow. None of the three known specimens has been reared. All are from New Mexico and Melander's is from Cloudcroft at an elevation of 9,000 feet.

***Liriomyza fumicosta* (Malloch)**

Agromyza fumicosta Malloch, Ent. News, vol. 25, p. 310, 1914.

Unique among *Liriomyza* species in having the costal area light brown (fig. 108). The mesonotum is slightly lighter brown centrally than the marginal stripes, there are two sparse rows of acrostichals, and the scutellum is entirely yellow (fig. 109). There are two known specimens, both from Illinois.

***Liriomyza langei* Frick**

Agromyza orbona (Meigen), Melander (part), Journ. New York Ent. Soc., vol. 21, p. 258, 1913 (2 ♀ ♀, Pullman, Wash., from peas).
Liriomyza langei Frick, Pan-Pacific Ent., vol. 21, p. 81, 1951 (figure of anepisternum); Proc. Ent. Soc. Washington, vol. 60, No. 1, p. 1, 1958 (figures of head and pleura).

This species has the third antennal segment darkened distally and the femora marked with yellow streaks. Crossvein m-m is sometimes lacking. *Liriomyza langei* may be separated from *L. chlamydata* by having the mesepimeron at least one-half yellow, humeral seta mostly on yellow, and the setulae of the third antennal segment about one-half as long as the basal diameter of the arista. Of 1,000 specimens examined, 81.7 percent have m-m present in both wings, 5.7 percent with one m-m complete and one vestigial, 1.0 percent with one crossvein complete and one absent, 6.8 percent with m-m vestigial in both wings, 2.9 percent with one vestigial and one absent, and 1.9 percent with crossvein m-m absent in both wings. Two similar species, *L. quadrisetosa* and *L. baptisiae*, have the third antennal segment black and the femora black except for being narrowly yellow distally. *L. langei* is very similar to *L. dianthi*. However, *L. langei* is over-all more yellow and has the pteropleuron and mesepimeron each about one-half yellow and the femora streaked with yellow.

The larvae of *L. langei* have been found mining the leaves of a wide range of plants as follows: *Allium cepa* L. (Liliaceae), *Beta vulgaris* L. and *Spinacia oleracea* L. (Chenopodiaceae), *Brassica oleracea* var. *botrytis* L. (Cruciferae), *Pisum sativum* L. (Leguminosae), *Apium graveolens* var. *dulce* Pers. (Umbelliferae), and *Petunia* sp. (Solanaceae), *Aster* spp., and *Lactuca sativa* L., cultivated varieties (Compositae). Thus far no uncultivated plants have been found as larval hosts. *L. langei* has been identified from Washington, Oregon, and California.

Liriomyza lima (Melander)

Agromyza lima Melander, Journ. New York Ent. Soc., vol. 21, p. 265, 1913.
Agromyza holti Malloch, Canadian Ent., vol. 56, p. 191, 1924.

This species is distinctive in the "*pusilla* complex" in having the margin and fringe of the calypter white. The head has a very wide gena and the eye subquadrate (fig. 110). Melander's series is from Idaho while Malloch's specimen is from South Dakota.

Liriomyza lutea (Meigen)

Agromyza lutea Meigen, Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten, vol. 6, p. 177, 1830.
Liriomyza lutea (Meigen), Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 230, 1931 (figures of head of wing).—Spencer, Ent. Gaz., vol. 5, p. 185, 1954.

Liriomyza lutea is a very yellow species that has the scutellum entirely yellow. It is close to *L. melampyga* but differs in having only a few setulae on the mesonotum and the acrostichals in two rows. The dark color of the mesonotum is light reddish brown as contrasted with

the dark brown of *L. melampyga*. Spencer in England has recently reared this species for the first time from *Asplenium rutamuraria* L. I have identified one specimen from Alaska that was compared with two from Europe.

Liriomyza marginalis (Malloch)

Agromyza marginalis Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 283, 1913.

This species is closely related to *Liriomyza sorosis* and *L. barrocoloradensis* but has only three dorsocentrals, one presutural and two postsutural (fig. 111). The mesonotum has the central area light reddish and the marginal stripes dark brown, whereas in *L. barrocoloradensis* the colors are reversed and in *L. sorosis* the dark area is uniformly dark brown. The head has the eye widest below the midline (fig. 112), while it is above the midline in the other two species (fig. 125). The larvae mine in *Paspalum dilatatum* Poir. I have seen specimens from Illinois, Texas, and South Carolina.

Liriomyza melampyga (Loew)

Agromyza melampyga Loew, Berliner Ent. Zeitschr., vol. 13, p. 48, 1869 (Centuria VIII, No. 88)—Melander (part), Journ. New York Ent. Soc., vol. 21, p. 258, 1913 (1 ♀, Massachusetts).

Agromyza flaviventris Johnson (not Strobl, 1898), Canadian Ent., vol. 34, p. 242, 1902.

This species has the scutellum entirely yellow and the mesonotum bearing four developed dorsocentral setae (fig. 113). The mesonotal color pattern is like that of *L. barrocoloradensis* but is all dark brown. This species is close to *L. lutea* but the mesonotal dark area of *L. lutea* is light reddish brown and there are only two rows of acrostichals. The head used for the illustration was not that of the teneral type but of a female from Glen Echo, Md. (fig. 114). The larval host plants remain unknown. I have seen specimens from Michigan, District of Columbia, Maryland, New Jersey, New York, and Massachusetts.

Liriomyza munda Frick

Liriomyza munda Frick, Pan-Pacific Ent., vol. 33, p. 61, 1957.

This species may be separated from *Liriomyza eupatorii* by having crossvein m-m at its own length from r-m and from *L. verbenicola* by a long inner postalar seta (about one-half the length of the outer) and with about twice as many setulae (seven to nine) in the intraalar row posterior to the transverse suture. The larvae make serpentine mines in the leaves of *Lycopersicon esculantum* Mill., rarely *Solanum tuberosum* L., and the native *Datura meteloides* DC. in California.

Liriomyza pacifica (Melander)

Agromyza pacifica Melander, Journ. New York Ent. Soc., vol. 21, p. 264, 1913.
Agromyza longispinosa Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 276, 1913.

This species is one of two having the mesonotum dull and pollinose and the third antennal segment black. The other, *Liriomyza fumicosta*, varies in having the costal area tinged light brown and a completely yellow scutellum. The head of *L. pacifica* is mostly yellow and the black of the occiput does not touch the eye margin (fig. 115). There is only one lower-orbital seta. Larval host plants are unknown. The species has been found in Washington, Illinois, Indiana, Michigan, Alaska, and from British Columbia and Ontario.

Liriomyza phaseolunata (Frost)

Agromyza phaseolunata Frost, Journ. New York Ent. Soc., vol. 51, p. 256, 1943.

This species has two rows of acrostichals and is therefore closely related to *Liriomyza trifolii* and *L. allia*. *L. phaseolunata* is more yellow than *L. trifolii* and does not have the black of the occiput reaching the eye margin, and the inner postalar seta is on yellow. In contrast to *L. allia*. the mesonotum is subshining and not pollinose. The larvae mine the leaves of *Phaseolus limensis* Macfad. in New Jersey.

Liriomyza pictella (Thomson)

Agromyza pictella Thomson, Diptera, *in* Kongliga Svenska Fregatten *Eugenies* . . . , vol. 6, pt. 2, p. 609, 1868.
Liriomyza pictella (Thomson), Frick, Pan-Pacific Ent., vol. 33, p. 66, 1957.

Liriomyza pictella is similar to *L. propepusilla* but differs in having the first dorsocentral developed and about one-third as long as the fourth dorsocentral. The anepisternum is about one-half yellow while that of *L. propepusilla* is about three-fourths dark (fig. 116). The larvae form serpentine mines in the leaves of about 16 species of native and cultivated plants throughout California. Frick (1957b) has tabulated all of the host plant and locality records. Since that paper was published I have seen a single specimen from Arizona, swept from alfalfa.

Liriomyza propepusilla (Frost)

Agromyza subpusilla Frost (not Malloch, 1914), Journ. New York Ent. Soc., vol. 51, p. 255, 1943.
Phytomyza subpusilla Frost, Ent. News, vol. 65, p. 73, 1954.
Liriomyza propepusilla Frost, Ent. News, vol. 65, p. 73, 1954.—Frick, Pan-Pacific Ent., vol. 33, p. 62, 1957.

The name of this species erroneously has been associated with the common California leaf miner, *Liriomyza pictella*. *L. propepusilla* is darker over-all and has the episternum about three-fourths dark (fig.

116). The first dorsocentral is very short and subequal to an acrostichal seta in length. The head (fig. 117), wing (fig. 118), and anepisternum (fig. 116) are illustrated in order to help characterize this species, which is at present known from a single male from Kansas.

***Liriomyza quadrisetosa* (Malloch)**

Agromyza quadrisetosa Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 332, 1913.

The head of this rather diverse species is subtriangular in profile, and the genovertical plate is darkened from the vertex for about one-third of the length and bears one upper-orbital and four or five lower-orbitals (fig. 119). The third antennal segment is black, the femora are totally brown, and the wing has crossvein m-m about one-fourth of its length from r-m. There are specimens from Texas, Indiana, and New York.

***Liriomyza reverberata* (Malloch), new combination**

Agromyza reverberata Malloch, 1924, Canadian Ent., vol. 56, p. 191, 1924.—Frick, Univ. California Publ. Ent., vol. 8, p. 375, 1952.

Of the four specimens mentioned in Malloch's description only one could be found; namely, a female paratype in the Canadian National Collection (No. 3398) labeled "Glen Echo, Maryland, V–14–1922 (J. R. Malloch), *Agromyza reverberata* Paratype." The other specimens were to remain in Malloch's personal collection, or so he stated. The U. S. National Museum acquired Malloch's collection but the types of *Liriomyza reverberata* were apparently missing. Because this species is quite distinct, a neotype designation is unnecessary. Left in *Agromyza* by Frick on the basis of the description, the species belongs in *Liriomyza*.

This species is most closely related to *L. variata* but differs in the short inner postalar seta and in having one or two lower-orbitals. The mesonotum is illustrated to show the color pattern and the fully developed intraalar seta (fig. 120). The wing has vein R_{2+3} undulating (fig. 121). The mesonotum is subshining but not pollinose. There are three specimens from Ontario in the Canadian National Collection together with the paratype from Maryland.

***Liriomyza schmidti* (Aldrich)**

Agromyza schmidti Aldrich, Proc. Ent. Soc. Washington, vol. 31, p. 89, 1929.

This species has the anepisternum entirely yellow, dark basal scutellar triangles present, and both vertical setae arising from the black of the vertex (fig. 122). The wing has the ultimate section of vein M_{1+2} curved (fig. 123). The larvae make serpentine mines in the leaves of *Gliricidia sepium* (Jacq.) (=*G. maculata*) in Costa Rica.

***Liriomyza sorosis* (Williston), new combination**

Agromyza sorosis Williston, Trans. Ent. Soc. London (1896), p. 429, 1896.—Melander (part), Journ. New York Ent. Soc., vol. 21, p. 258, 1913 (2 ♂♂, Texas and Illinois, excluding 1 ♂ from Bolivia).

Agromyza melampyga (Loew), Coquillett (part), U. S. Dep. Agr., Div. Ent. Bull. 10, p. 78, 1898.—Malloch (part), Ann. Ent. Soc. Amer., vol. 6, p. 282, 1913 (specimens from *Plantago* spp.)—Frost, Mem. Cornell Univ. Agr. Exp. Sta., vol. 78, p. 47, 1924.—Frick, Univ. California Publ. Ent., vol. 8, p. 404, 1952.

Lectotype male (British Museum, Natural History) from windward side of St. Vincent, Windward Islands, West Indies, 1907–66 (H. H. Smith). This specimen is labeled "Cotype" while a headless male in the American Museum of Natural History (No. 20332) and a female in the Snow Entomological Museum are each labeled "Type." None of the British Museum syntypes, according to H. Oldroyd, bears the label "Mt. St. Andreas at Cavalries Forest, 1,200 feet. Oct. 16." Such a specimen Williston considered as one of the typical specimens in a series that showed such variation that he mentioned the variation. *Liriomyza sorosis* includes the specimens of *Agromyza melampyga* (of authors) that had been reared from *Plantago major* L., *P. media* L., and possibly other species of *Plantago*.

Liriomyza sorosis is close to *L. marginalis* and *L. barrocoloradensis* but has the mesonotum a uniform dark brown (fig. 124). There are usually four dorsocentrals, but frequently the second is greatly reduced or absent. The head is very similar to that of *L. barrocoloradensis* in having the eye widest above the midline (fig. 125). The type series is from St. Vincent, British West Indies, but specimens have been found in the United States from South Dakota, Illinois, Indiana, Michigan, Pennsylvania, Maryland, Virginia, Florida, and Texas.

***Liriomyza trifolii* (Burgess)**

Oscinis trifolii Burgess, Ann. Rep. U. S. Dep. Agr. (1879), p. 200, 1880.

Liriomyza congesta (Becker), Mitt. Zool. Mus., vol. 2, p. 190, 1903.

Agromyza pusilla (Meigen), Frost (part), Mem. Cornell Univ. Agr. Exp. Sta., vol. 78, p. 51, 1924 (figure of leaf mine on *Trifolium repens*).

This species belongs to the group with only two rows of acrostichal setae. It is slightly darker than *Liriomyza allia* or *L. phaseolunata*, has the black of the occiput reaching the eye margin, and its mesonotum has the inner postalar seta on black. The larvae form serpentine mines in the leaves of many species of legumes in Europe and I have reared it from *Trifolium hybridum* L., *T. repens* L., *Medicago sativa* L., *Melilotus alba* Desr., *M. indica* All., and *Vicia villosa* Roth in Washington. I have seen specimens from Washington, Oregon, California, Indiana, and Florida, but the species is probably present throughout the United States.

Liriomyza tubifer Melander

Liriomyza tubifer Melander, Journ. New York Ent. Soc., vol. 21, p. 266, 1913.

This species is similar to *Liriomyza borealis* in coloration but differs in having the maxillary palpus brown and the gena narrow, posteriorly not more than one-fourth the eye height. The mesonotum has the yellow of the intraalar row reaching anteriorly about two-thirds of the distance to the transverse suture. There is a single female in Melander's collection from Haiti.

Liriomyza variata (Malloch)

Agromyza variata Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 277, 1913 (figure of wing).

The holotype female is in the Museum of Comparative Zoology (No. 27062). This species is close to *Liriomyza reverberata* in having the mesonotum subshining and not pollinose. However, both postalars are subequal in length and the head has the maxillary palpus distally darkened, three lower-orbitals, and the third antennal segment subquadrate and distally darkened (fig. 126). The wing has vein R_{2+3} undulating (fig. 127). Known from a single specimen from Maine.

Liriomyza verbenicola Hering

Liriomyza verbenicola Hering, Notulae Ent., vol. 31, p. 43, 1951.

The holotype female is in the U. S. National Museum (64301). The type is in very poor condition and the head has turned black probably due to slow drying conditions following death. Therefore, the characters used to separate this species from *Liriomyza munda* are on the mesonotum. *L. verbenicola* has a short inner postalar seta (about one-fourth to one-third the outer) and has very few (about five) setulae in the intraalar row posterior to the transverse suture. The larvae form serpentine mines in the leaves of *Verbena* sp. The type series is from New Mexico. Hering has a mined leaf from Salt Lake City, Utah, that he identified with this species.

3. Genus *Metopomyza* Enderlein

Metopomyza Enderlein, Tierw. Mitteleuropas, vol. 6, No. 3, p. 180, 1936.

This is a small genus closely related to *Liriomyza*. There are about seven Palaearctic species and one from North America. *Metopomyza* is characterized by the wide, prominent genovertical plates that are abruptly raised above the plane of the frontal vitta (fig. 128). *Liriomyza deceptiva* has these plates prominent but they are proportionately narrower except immediately dorsad of the antenna (fig. 104). Species

included here are mostly black or dark brown and usually have some yellow markings. There are a few *Liriomyza* species that are as dark colored.

***Metopomyza interfrontalis* (Melander)**

Agromyza interfrontalis Melander, Journ. New York Ent. Soc., vol. 21, p. 263, 1913.

Thus far the only species of *Metopomyza* known in North America, it may be distinguished from *Liriomyza* species by the broad, prominent genovertical plates (fig. 128). This is a shining black species that has the frontal vitta dark yellow, scutellum medially yellow, calypter with margin and fringe yellow, some abdominal tergites posteriorly yellow, and all femora distally yellow for a distance subequal to the femoral diameter. No larval host plants are known. I have seen specimens from the northern half of California, Washington, Texas, Kansas, Illinois, Michigan, and Virginia. There are many specimens in the Canadian National Collection.

9. Genus *Haplomyza* Hendel

Antineura Melander (not Osten Sacken, 1881), Journ. New York Ent. Soc., vol. 21, p. 219, 1913.
Haplomyza Hendel, Ent. Mitt., vol. 3, p. 73, 1914.

The characters used in the key to separate *Haplomyza* from *Liriomyza* appear superficial. However, with the combination of four characters—(1) mesonotum dull, heavily gray pollinose, (2) two sparse rows of acrostichals, (3) crossvein m-m absent, and (4) only one upper-orbital (fig. 129)—go wide and clearcut differences in the male terminalia and posterior spiracles of the larvae. Certain species of *Liriomyza* in Europe have as many as three of the characters occurring together. Among North American *Liriomyza* not more than any two occur together. On the basis of this restricted concept of characters for *Haplomyza* species, *Antineura chlamydata* Melander belongs in *Liriomyza* because the mesonotum is shining and there are four rows of acrostichals and two upper-orbitals.

Haplomyza is a small genus with three North American species. Of the Palaearctic species described by Hendel (1931) only one, *Liriomyza deficiens* (Hendel), appears to belong here. *Haplomyza lopesi* Oliveira and Silva (1954) from Brazil seems to be properly placed.

Key to the described species of *Haplomyza*

1. Inner postalar seta arising from black; scutellum with basal scutellar seta arising from large lateral black triangle 2
   Inner postalar seta arising from yellow; scutellum broadly yellow, basal scutellar arising from yellow . . . . . **palliata**

2. Third antennal segment yellow; scutellum about one-half yellow, distal scutellar seta arising from yellow . . . . . **togata**
Third antennal segment brownish on distal one-third; scutellum about one-third yellow, distal scutellar arising from black . . . . . **minuta**

***Haplomyza minuta* (Frost)**

Phytomyza minuta Frost (part), Mem. Cornell Univ. Agri. Exp. Sta., vol. 78, p. 86, 1924 (1 ♀, Fargo, N. Dak.).
Haplomyza minuta (Frost), Frick, Canadian Ent., vol. 85, p. 73, 1953.

This is the darkest of the three species. The third antennal segment is distally brownish and the scutellum is not more than one-third yellow. The larvae make serpentine-blotch mines in the leaves of *Chenopodium album* L. in Washington. The lectotype female is from Fargo, N. Dak.

***Haplomyza palliata* (Coquillett)**

Phytomyza palliata Coquillett, Journ. New York Ent. Soc., vol. 10, p. 191, 1902.

The yellowest of the three species, *Haplomyza palliata* has the black of the occiput not reaching the eye margin, the inner postalar seta on yellow, and the basal scutellar seta on yellow. The larvae mine in *Portulaca* sp. in New Mexico.

***Haplomyza togata* (Melander)**

Antineura togata Melander, Journ. New York Ent. Soc., vol. 21, p. 250, 1913.
Phytomyza minuta Frost (part), Mem. Cornell Univ. Agri. Exp. Sta., vol. 78, p. 86, 1924 (3, New Mexico, Texas, and Bismarck, N. Dak.).—Frick, Canadian Ent., vol. 85, p. 73, 1953.

Haplomyza togata is intermediate between the more yellow *H. palliata* and the darker *H. minuta*. The third antennal segment is yellow, the inner postalar is on black, and the scutellum has the basal seta arising from black and the distal from yellow. The head is illustrated to show the single reclinate upper-orbital (fig. 129). The larvae form serpentine-blotch mines in the leaves of *Amaranthus hybridus* L. and *A. retroflexus* L. The species is apparently widespread, with identified specimens from Washington, California, New Mexico, Texas, Kansas, and North Dakota.

10. Genus *Phytoliriomyza* Hendel

Phytoliriomyza Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 203, 1931 (as subgenus).

This genus is characterized by having the orbital setulae proclinate and the costa ending at vein M_{1+2}. *Phytoliriomyza*, as its name suggests, together with the closely related *Xyraeomyia* form a connecting link between the more generalized genera and the more specialized genera related to *Phytomyza* (Frick, 1952). The head shape is very

similar throughout the genus and is much like that of *Xyraeomyia conjunctimontis* (fig. 130). *Phytoliriomyza* may be separated from *Xyraeomyia* by the fully developed axillary lobe and calypter and the presence of acrostichal setae and crossvein m-m.

Phytoliriomyza is a small but widely distributed genus. There are three species from North America, two from Europe, and one each from extreme southern South America, Formosa, and Hawaii. Frick (1953b) gave a key to the species of the world known at that time. Since then the correct status of *P. arctica* (Lundbeck), *P. immaculata* (Coquillett), and *P. imperfecta* (Malloch) has been determined.

Key to the described species of *Phytoliriomyza*

1. Eye bare; anepisternum mostly yellow with a ventral dark area 2
   Eye setulose; anepisternum gray, dorsally narrowly yellow . . . . . **arctica**
2. Vein M_{3+4} with ultimate section about 1.5 times as long as penultimate section; abdominal tergites gray in lateral view . . . . . **immaculata**
   Vein M_{3+4} with ultimate section about twice as long as penultimate section; abdominal tergites yellow in lateral view . . . . . **perpusilla**

Phytoliriomyza arctica (Lundbeck)

Agromyza arctica Lundbeck, Vidensk. Medd. Naturh. For. Kjøbenhavn, vol. 5, p. 304, 1900 (figure of wing).

Phytoliriomyza arctica (Lundbeck), Shewell, Canadian Ent., vol. 85, p. 469, 1953.

This species is unique among North American species of *Phytoliriomyza* in having the eye setulose and the anepisternum mostly dark gray. *P. montana* Frick of Hawaii is the most similar species but has the maxillary palpi black while they are yellow in *P. arctica*. No larval host plants are known. Lundbeck notes that the species is found especially in willow thickets along the west coast of Greenland as far north as latitude 69°. The types are from Greenland and I have seen two specimens from Yale and Bear Lake, British Columbia.

Phytoliriomyza immaculata (Coquillett)

Odinia immaculata Coquillett, Journ. New York Ent. Soc., vol. 10, p. 185, 1902.

Agromyza immaculata (Coquillett), Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 289, 1913 (figure of wing).

Agromyza perpusilla (Meigen), Melander, Journ. New York Ent. Soc., vol. 21, p. 257, 1913.

The holotype of *Phytoliriomyza immaculata* is teneral and therefore easily confused with the more yellowish *P. perpusilla*. The abdominal tergites of *P. immaculata* are dark when viewed laterally as contrasted with the laterally yellow tergites of *P. perpusilla*. Also, the ultimate section of M_{3+4} is shorter (1:1.5 vs. 1:2) in *P. immaculata*. This species is widespread and I have seen specimens from California, Washington, Idaho, New Mexico, South Dakota, Minnesota, Kansas,

Oklahoma, Missouri, Michigan, Indiana, Kentucky, Tennessee, Maryland, and New Hampshire as well as from British Columbia and Manitoba.

Phytoliriomyza perpusilla (Meigen)

Agromyza perpusilla Meigen, Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten, vol. 6, p. 181, 1830.

Phytoliriomyza perpusilla (Meigen), Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 303, 1931 (figures of head and wing).—Frick, Univ. California Publ. Ent., vol. 8, p. 411, 1952 (figure of wing).

This is the most yellow of the three species and the abdominal tergites are mostly yellow when viewed laterally. The wing has the ultimate section of M_{3+4} twice as long as the penultimate. Apparently rare, I have seen specimens from California, Washington, Montana, and New Mexico.

11. Genus *Xyraeomyia* Frick

Xyraeomyia Frick, Univ. California Publ. Ent., vol. 8, p. 412, 1952 (figure of wing).

This genus was erected for a single species that is very closely related to *Phytoliriomyza*. *Xyraeomyia* and *Phytoliriomyza* form a connecting link between the more generalized genera and the more specialized genera related to *Phytomyza* (Frick, 1952). However, *Xyraeomyia* is the more specialized of the two in having the axillary lobe and calypter greatly reduced, crossvein m–m absent, and no acrostichals. The head has the eye forwardly inclined, the orbital setulae proclinate, and a relatively long arista (fig. 130).

Xyraeomyia conjunctimontis Frick

Xyraeomyia conjunctimontis Frick, Univ. California Publ. Ent., vol. 8, p. 413, 1952 (figure of wing).

This is a small species (1.15 to 1.3 mm. in wing length) that is yellow and brown, the latter being dull gray pollinose. The head has the eye forwardly inclined and an extremely long arista (fig. 130). The arista is slightly longer than the eye is high. The eye is setulose but the setulae are very short. There are no setulae on the mesonotum other than in the dorsocentral rows and the calypter is reduced to a narrow strip with brown margin and fringe. The type series, from central California, was swept.

12. Genus *Phytagromyza* Hendel

Phytagromyza Hendel, Arch. Naturg., Abt. A, vol. 84, p. 145, 1920.

This is a moderately large genus of species that vary widely from one another. They all have in common the orbital setulae either absent or reclinate (fig. 131), the costa ending at R_{4+5}, crossvein m–m absent or, when present, distad of crossvein r–m (fig. 134). In fact, the

position of m–m and the presence or absence of the basal section of M_{3+4} are the only characters that separate all species of *Phytogromyza* from *Pseudonapomyza*. In *Pseudonapomyza*, m–m is basal to r–m and appears to be the basal section of M_{3+4} (fig. 135). There are species in *Phytagromyza* that lack the orbital setulae and have only one upper-orbital, one to five lower-orbitals, the third antennal segment as angulate as it is in *Pseudonapomyza* (fig. 136), two to seven dorsocentrals, and the intraalar and prescutellar setae present or absent. The larvae of the type species, *Phytogromyza flavocingulata* (Strobl), mine the leaves of grasses. The larvae of *Pseudonapomyza* species mine exclusively in species of Gramineae.

Phytagromyza and *Pseudonapomyza* are the only genera in the *Phytomyza* group that have the orbital setulae erect or reclinate. The group of genera closely related to *Phytomyza* has the costa ending at R_{4+5}, and M_{1+2} is the weakest vein (figs. 134, 145).

There are only five described species in North America, three of which are Nearctic in distribution and two are Holarctic. There are about 27 species described from the Palaearctic region.

Key to the described species of *Phytagromyza*

1. Crossvein m–m present (fig. 134) 2
   Crossvein m–m absent 4
2. Mouthparts not elongate, in length less than the eye height (fig. 133); mesonotum dull black, grayish pollinose 3
   Mouthparts elongate, in length subequal to the eye height (fig. 131); mesonotum shining dark brown . . . . . **nitida**
3. Head with two or three orbital setulae (fig. 133); notopleural triangle yellow. **plagiata**
   Head with six or seven orbital setulae; notopleural triangle brown . **lonicerae**
4. Veins R_{4+5} and M_{1+2} with wing tip between them; head, pleura, and legs mostly dark brown . . . . . **orbitalis**
   Vein M_{1+2} at wing tip; head, pleura, and legs yellow . . . . . **populicola**

Phytagromyza lonicerae (Robineau-Desvoidy)

Phytomyza lonicerae Robineau-Desvoidy, Rev. Mag. Zool., ser. 2, vol. 3, p. 396, 1851.

Phytagromyza lonicerae (Robineau-Desvoidy), Hering, Notulae Ent., vol. 31, p. 36, 1951 (figures of larval and puparial characters).

This dark Holarctic species has the mesonotum dull black and grayish pollinose and the notopleural triangle dark brown. There are about six developed dorsocentral setae, the head is dark except for the yellow dorsal half of the frontal vitta, and the eye is about four-fifths as long as high. The larvae form very wide serpentine mines in the leaves of *Lonicera involucrata* Banks and *Symphoricarpos albus* (L.) Blake. The larvae appear early in the spring and there is only one generation a year. I have seen no specimens other than my reared series from central California.

***Phytagromyza nitida* (Malloch)**

Agromyza nitida Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 288, 1913 (figures of head and wing).

A diverse species having the mouthparts elongate, *Phytagromyza nitida* is distinct from other North American species. The head is partially yellow and has the eye much higher than long, only the dorsal upper-orbital reclinate, and the mouthparts elongate (fig. 131). There are only two developed dorsocentral setae. No larval host plants are known. I have seen specimens from Iowa, Illinois, Maryland, Virginia, and North Carolina.

***Phytagromyza orbitalis* (Melander)**

Phytomyza orbitalis Melander, Journ. New York Ent. Soc., vol. 21, p. 271, 1913.

Phytagromyza orbitalis and *P. populicola* lack crossvein m-m, but *P. orbitalis* has the genovertical plates yellow in contrast to the darker frontal vitta, head, and antenna (fig. 132), dark brown mesonotum, pleura, and legs, and the wing tip between R_{4+5} and M_{1+2}. In common with *P. plagiata* and *P. lonicerae* there are about six developed dorsocentral setae. The larvae form blotch mines in the leaves of *Symphoricarpos albus* (L.), *S. mollis* Nutt., and *S. rotundifolius* Gray. I have seen mined leaves on *Symphoricarpos* at Kamiac Butte, Wash., the type locality. Thus far *P. orbitalis* is known from Washington, Idaho, and California.

***Phytagromyza plagiata* (Melander)**

Napomyza plagiata Melander, Journ. New York Ent. Soc., vol. 21, p. 273, 1913.
Agromyza brevicostalis Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 283, 1913.

This species, in common with *Phytagromyza lonicerae*, has crossvein m-m present, mouthparts not elongate (fig. 133), and mesonotum dull grayish pollinose with about six developed dorsocentral setae. It may be distinguished by the head having the gena mostly yellow and the two or three orbital setulae (fig. 133). The notopleural triangle is yellow. Larval host plants are unknown and the species is known from two specimens, one from Idaho and the other from Montana.

***Phytagromyza populicola* (Walker)**

Phytomyza populicola Haliday (MS), Walker, Insecta Britannica, Diptera, vol. 2, p. 247, 1853.—Hendel, Arch. Naturg., Abt. A, vol. 84, p. 154, 1920.
Phytomyza populicola Walker, Kaltenbach, Die Pflanzenfeinde aus der Insekten, p. 560, 1874.—Becker, *in* Becker, Bezzi, et al., Katalog paläarktischen Dipteren, vol. 4, p. 258, 1905.
Phytagromyza populicola (Haliday), Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 289, 1932 (figure of head).

This species should be credited to Walker because Haliday did not publish a description. *Phytagromyza populicola* is a small yellow

species without crossvein m-m in the wing. It may be separated from *P. orbitalis* by the yellow head, antenna, pleura, and legs. The mesonotum is yellow with three light reddish brown vittae and vein M_{1+2} ends at the wing tip. E. M. Hering collected the greenish blotch mines on leaves of *Populus deltoides* Marsh. in Ontario and he identified adults in the Canadian National Collection from Ottawa, Ontario. G. E. Shewell kindly presented me with six adults and six larvae. He reports that this species suddenly appeared in large numbers for the first time in 1956.

13. Genus *Pseudonapomyza* Hendel

Pseudonapomyza Hendel, Arch. Naturg., Abt. A., vol. 84, p. 115, 1920.

Pseudonapomyza belongs to the *Phytomyza* group of genera but is most closely related to *Phytagromyza* in having the orbital setulae reclinate (fig. 136). The species of *Phytagromyza* are so diverse that all of the *Pseudonapomyza* characters but one are to be found among one or more of the *Phytagromyza* species. *Pseudonapomyza* may be separated from *Phytagromyza* by having crossvein m-m basad of crossvein r-m and appearing to be the basal section of M_{3+4} (fig. 135). The wings of *Phytagromyza* species have m-m distal to r-m (fig. 134), or absent.

There are three very similar species in the world. *Pseudonapomyza atra* is Holarctic, *P. lacteipennis* is Nearctic, and *P. spicata* (Malloch) is found on Formosa and throughout Micronesia and Hawaii. *P. spicata* may be separated from the other two by the black tarsi, shining mesonotum, and the presence of both the inner postalar and intraalar setae. All three species have one upper-orbital, three or four lower-orbitals, the third antennal segment strongly angulate (fig. 136), three dorsocentrals, and the wing as described and illustrated (fig. 135). The larvae of two species, *P. atra* and *P. spicata*, mine the leaves of grasses and have a row of elongate spines on each body segment.

Key to the described species of *Pseudonapomyza*

1. Tarsi dark brown or black; mesonotum subshining, slightly gray pollinose, one intraalar seta and no inner postalar. . . . . **atra**
   Tarsi with basal four segments yellowish, distal segment dark brown; mesonotum dull, bluish pollinose, no intraalar and one inner postalar. **lacteipennis**

Pseudonapomyza atra (Meigen)

Phytomyza atra Meigen, Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten, vol. 6, p. 191, 1830.

Pseudonapomyza atra (Meigen), Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 302, 1932 (figures of head and wing).

Phytomyza acuticornis Loew, Wiener Ent. Monatsschr., vol. 2, p. 78, 1858.

Phytomyza nitidula Malloch, Proc. U. S. Nat. Mus., vol. 46, p. 151, 1913.

This is a subshining black species that has the tarsi dark brown or black. The mesonotum is only slightly gray pollinose and bears an intraalar seta but lacks the inner postalar. The head is very similar to that of *Pseudonapomyza lacteipennis* (fig. 136). The larvae mine the leaves of many grasses in Europe and I have reared it from *Agropyron repens* (L.) and *Secale cereale* L. in Washington.

***Pseudonapomyza lacteipennis* (Malloch)**

Phytomyza lacteipennis Malloch, Proc. U. S. Nat. Mus., vol. 46, p. 152, 1913.
Phytomyza acuticornis (Loew), Melander, Journ. New York Ent. Soc., vol. 21, p. 269, 1913.

This species is unusual in having the basal four tarsal segments yellowish. The mesonotum is dull black and heavily bluish pollinose and lacks an intraalar but bears the inner postalar seta. The head (fig. 136) is typical for a species of this genus in having the third antennal segment angulate, only one upper-orbital seta, and three or four lower-orbitals. No larval host plants are known but they are probably grasses. I have seen specimens from Washington, New Mexico, Kansas, North Dakota, and Michigan. This species is apparently common and widespread in North America.

14. Genus *Napomyza* Westwood

Napomyza Westwood, An introduction to the modern classification of insects, vol. 2, p. 152, 1840.

Napomyza is a small genus separated from *Phytomyza* by the presence of crossvein m-m. Like *Phytomyza*, the orbital setulae are proclinate (fig. 137). There are about 20 Palaearctic species, one of which is found in North America. There are three in the Nearctic region, with *N. lateralis* being Holarctic in distribution. None is known from the Neotropical region. *Napomyza anomala* of Melander is deleted because Melander's specimen is incorrectly identified.

Key to the described species of *Napomyza*

1. Acrostichal setae in two irregular rows 2
   Acrostical setae in four or five irregular rows . . . . . **davisii**
2. Wing with vein M_{1+2} ending at wing tip; maxillary palpus not broadened distally . . . . . **lateralis**
   Wing with tip between R_{4+5} and M_{1+2}; maxillary palpus expanded distally to about one-half the diameter of the third antennal segment (fig. 138). **parvicella**

***Napomyza davisii* (Walton)**

Agromyza davisii Walton, Ent. News, vol. 23, p. 463, 1912.—Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 284, 1913 (figure of wing).

This is a valid species and may be separated from the other two *Napomyza* species by having four or five rows of acrostichal setae and

the genovertical plates not extending beyond the eye margin (fig. 137). Crossvein m-m is beyond r-m. The larvae mine the leaves of *Ranunculus* spp. I have seen specimens from Missouri, Indiana, Michigan, Wisconsin, and from Ontario.

Napomyza lateralis (Fallén)

Phytomyza lateralis Fallén, Diptera sueciae, vol. 2, No. 41 (Phytomyzides), p. 3, 1823.

Napomyza lateralis (Fallén), Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 315, 1932 (figures of head and wing).

Napomyza lateralis is a Holarctic species that has two rows of acrostichal setae which separate it from *N. davisii*. From *N. parvicella*, *N. lateralis* may be distinguished by the maxillary palpus not being broadened distally and vein M_{1+2} being at the wing tip. In Europe the larvae mine in the receptacles and the pith of stems of many annual plants. In North America, this species was reared from *Achillea millefolium* var. *lanulosa* Piper in California. I have seen specimens from California, Oregon, Colorado, and Alaska.

Napomyza parvicella (Coquillett)

Agromyza parvicella Coquillett, Journ. New York Ent. Soc., vol. 10, p. 189, 1902.—Malloch, Ann. Ent. Soc. Amer., vol. 6, p. 287, 1913 (figures of head and wing).

Napomyza parvicella differs from *N. davisii* in having only two rows of acrostichals and the genovertical plates extending beyond the eye margin (fig. 138). The maxillary palpus is broadened and the wing tip is between veins R_{4+5} and M_{1+2}, characters which serve to separate *N. parvicella* from *N. lateralis*. The eye is setulose. Known from one female from Alaska.

15. Genus *Phytomyza* Fallén

Phytomyza Fallén, Specimen entomologicum novam Diptera disponendi methodum exhibens, p. 21 (No. 67), 1810 (figure of wing).

The most specialized North American genus, *Phytomyza* has the orbital setulae proclinate (fig. 139), crossvein m-m absent, and M_{1+2} the weakest vein (fig. 145). *Napomyza* is the only closely related genus and is separated by having crossvein m-m present.

There are only 39 described *Phytomyza* species in North America as compared to the 201 listed for the Palaearctic region in 1936 by Hendel. Since that time many more European species have been described. The North American species are rather evenly distributed throughout the genus as divided in Hendel's key. The first species to be separated out by the use of that key to Palaearctic species is *P. trivittata* (couplet 7), while the last is *P. loewii*, which keys out at the last couplet (No. 236).

The only closely related species that could be placed into a species group are those that are very similar to *P. ilicicola* (couplet 36). The larvae of these four species mine the leaves of woody shrubs and trees such as *Symphoricarpos* spp. (*P. periclymeni*), *Lonicera* spp. (*P. gregaria*), *Prunus* spp. (*P. persicae*), and *Ilex* spp. (*P. ilicicola*).

The following species names are not included in the present species list because I have found no specimens that agree with European specimens. These species are: *P. affinis* Fallén, *P. analis* Zetterstedt, *P. hieracii* Hendel, *P. nigritella* Zetterstedt, and *P. obscurella* Fallén.

Key to the described species of *Phytomyza*

1. Frons yellow, light orange, or reddish yellow 2
   Frons all or mostly brown or black, sometimes yellowish dorsally 29
2. Scutellum all or partially yellow 3
   Scutellum gray or black 6
3. Third antennal segment black or dark brown 4
   Third antennal segment yellow . . . . . **major**
4. Head with dorsal upper-orbital seta shorter than the ventral upper orbital, or absent (fig. 147) 5
   Head with both upper-orbitals of equal length and strength (fig. 168). **trivittata**
5. Vein R_{2+3} undulating, M_{1+2} straight or distally only slightly curved posteriorly; one lower-orbital . . . . . **ranunculi**
   Vein R_{2+3} straight, M_{1+2} undulating medially (fig. 148); two lower-orbitals (fig. 147) . . . . . **clemativora**
6. Femora entirely or mostly yellow, at most with brown streaks or spots . . 7
   Femora black or gray, sometimes distally yellow for a distance subequal to the femoral diameter 10
7. Antenna yellow, third segment sometimes darkened distally 8
   Antenna with third segment black, first and second yellow . . . . **nervosa**
8. Mesonotum heavily dull gray pollinose; head with two upper-orbital setae . 9
   Mesonotum shining black; only one upper-orbital . . . . . **flavicornis**
9. Anepisternum three-fourths dull gray, dorsal one-fourth and a very narrow posterior margin yellow. . . . . **rufipes**
   Anepisternum yellow, except for a ventral light brown triangle of about one-half the height and width of the anepisternum . . . . . **genalis**
10. Third antennal segment yellow, sometimes darkened distally (fig. 152). . 11
    Third antennal segment black 12
11. Third antennal segment setulose (fig. 144); intraalar row with two or three setulae anterior to and two or three posterior to the transverse suture . . . . . **auricornis**
    Third antennal segment bare (fig. 152); intraalar row with about four or five anterior to and about six posterior to the transverse suture. **flavinervis**
12. Mesonotum laterally yellow, including humerus and notopleural triangle . . 13
    Mesonotum laterally brown or black 16
13. Head with both upper-orbital setae of equal length and strength (fig. 164). . 14
    Head with dorsal upper-orbital seta shorter than the ventral, or absent. . . 15
14. Tarsi brown; mesonotum dull gray pollinose; gena medially about two-fifths as high as the eye height (fig. 149) . . . . . **delphinii**
    Tarsi yellow; mesonotum subshining brown; gena medially about one-eighth the eye height (fig. 164) . . . . . **plumiseta**

15. Anepisternum dorsally one-third to one-half yellow; only one developed upper-orbital seta . . . . . **albiceps**
Anepisternum dark, dorsally not more than one-fourth yellow; two developed upper-orbitals . . . . . **sphondylii**
16. Head with dorsal upper-orbital shorter than the ventral upper-orbital (fig. 140), or absent 17
Head with both upper-orbitals or equal length and strength (fig. 166) . . 18
17. Genovertical plates darkened (fig. 140); intraalar row with six to nine setulae anterior to and about five posterior to the transverse suture . . **angelicella**
Genovertical plates yellow (fig. 141); intraalar row with 10 to 12 setulae anterior to and about 13 to 15 posterior to the transverse suture . **aquilegiana**
18. Acrostichal setae in two to five rows 19
Acrostichal setae in six to eight rows (see also couplet 33) . . . . . **ilicis**
19. Acrostichal setae in two rows or absent 20
Acrostichal setae in four or five rows. . . . . **aquilegiana**
20. Mesofacial plate, including subantennal grooves, brown or black 21
Mesofacial plate yellow, not more than the subantennal grooves dark . . . 23
21. Eye bare 22
Eye setulose . . . . . **nigra**
22. Mesonotum without acrostichal setae or with not more than one to four; one lower-orbital present (see also couplet 26). . . . . **atricornis**
Mesonotum with about 14 acrostichals in two rows; three lower-orbitals present . . . . . **affinalis**
23. Forecoxa dark, distally yellow 24
Forecoxa entirely dark 26
24. Antenna with first and second segments yellowish; arista not greatly expanded (fig. 166) 25
Antenna with first and second segments brown or black; arista greatly expanded . . . . . **crassiseta**
25. Head with two strong lower-orbital setae (fig. 166); inner postalar seta present . . . . . **subtenella**
Head with one strong lower-orbital, sometimes with a very small second; inner postalar absent . . . . . **plantaginis**
26. Mesonotum with at least eight acrostichal setae in two rows. 27
Mesonotum without acrostichal setae, or with not more than one to four (see also couplet 22) . . . . . **atricornis**
27. Third antennal segment with setulae not longer than the basal diameter of the arista (fig. 150) 28
Third antennal segment with setulae two to three times as long as the basal diameter of the arista (fig. 156) . . . . . **lactuca**
28. Mesonotum with about 15 acrostichal setae; vein M_{1+2} gently undulating (fig. 143) . . . . . **atripalpis**
Meonotum with about nine acrostichal setae; vein M_{1+2} straight (fig. 151) . . . . . **dura**
29. Head with both upper-orbital setae of equal length and strength (fig. 159) . 30
Head with dorsal upper-orbital shorter than the ventral upper-orbital (fig. 157), or absent 39
30. Antenna dark brown or black; tarsi and tibiae black, brown or dark reddish brown 31
Antenna with first, second, and basal portion of third reddish yellow; tarsi and distal portion of tibiae yellow. . . . . **agromyzina**

31. Acrostichal setae in two rows 32
Acrostichal setae in four to eight rows 33
32. Third antennal segment subcircular (fig. 160); first dorsocentral seta about twice as far from the transverse suture as is the second . . . . **melanella**
Third antennal segment subrectangular, longer than wide (fig. 159); first and second dorsocentral setae about equidistant from the transverse suture. **marginalis**
33. Acrostichal setae in four or five rows 34
Acrostichal setae in six to eight rows (see also couplet 18) . . . . . **ilicis**
34. Intraalar row with not more than 16 setulae anterior to and not more than five posterior to the transverse suture; abdomen mostly dark 35
Intraalar row with about 24 setulae anterior to and about 12 posterior to the transverse suture; abdomen mostly yellow . . . . . **bicolor**
35. Forefemur distally yellow to reddish brown; wing veins basally yellow to light brown; wing length not exceeding 2.25 mm 36
Forefemur entirely black; wing veins basally black; wing length 2.5 to three mm . . . . . **nigrinervis**
36. Acrostichal setae extending posteriorly to the third dorsocentral 37
Acrostichal setae extending posteriorly to the fourth dorsocentral 38
37. Eye, viewed in profile, with length at most three-fourths the eye height; mesonotum dull brownish black . . . . . **gregaria**
Eye, viewed in profile, with length subequal to eye height; mesonotum dull bluish black . . . . . **periclymeni**
38. Forefemur distally reddish brown; mesonotum black, dull grayish pollinose. **persicae**
Forefemur distally yellow; mesonotum brown, dull bluish pollinose . **ilicicola**
39. Head with one or two upper-orbital setae; one or two lower-orbitals; wing length up to 2 mm 40
Head with one upper-orbital seta; three lower-orbitals; wing length at least 3 mm . . . . . **nigripennis**
40. Intraalar row with at least three setulae posterior to the transverse suture; inner postalar about one-half as long as the outer 41
Intraalar row with none to one setula posterior to the transverse suture; inner postalar small, up to one-third the length of the outer, or absent. **minuscula**
41. Forefemur distally brown; wing with second costal section about 1.5 times as long as the fourth (fig. 145) . . . . . **centralis**
Forefemur distally yellow; second costal section at least two times as long as the fourth (fig. 158) . . . . . **loewii**

Phytomyza affinalis Frost

Phytomyza affinalis Frost, Mem. Cornell Univ. Agr. Exp. Sta., vol. 78, p. 84, 1924.

The holotype male is in the U. S. National Museum (No. 50025). This species has the frons yellow, mesofacial plate dark, third antennal segment, mesonotal margins, scutellum, and femora dark, and both upper-orbitals of equal length and strength. It differs from *Phytomyza atricornis* in having about 14 acrostichals in two rows and the head bearing three lower-orbitals and a wide gena (fig. 139). The type series is from Saskatchewan.

Phytomyza agromyzina Meigen

Phytomyza agromyzina Meigen, Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten, vol. 6, p. 191, 1830.—Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 336, 1934 (figures of head and wing).

This is a rather distinctive Holarctic species that has the frons dark and both upper-orbitals of equal length, the antenna mostly reddish yellow, and the tarsi and tibiae yellow. The larvae make serpentine mines in the leaves of *Cornus* spp. Thus far known in North America only from California and Washington.

Phytomyza albiceps Meigen

Phytomyza albiceps Meigen, Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten, vol. 6, p. 194, 1830.—Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 337, 1934 (figures of head and wing).

Phytomyza albiceps sens. str. is not well known in North America. It belongs to those species having a yellow frons, dark third antennal segment, scutellum, and femora, and the mesonotum bordered with yellow. The dorsal upper-orbital is absent, or, if present, not developed and about the size of an orbital setula. The minute or absent dorsalmost orbital and the one-third to one-half yellow anepisternum separate this species from *P. sphondylii*. The larvae make serpentine mines in the leaves of *Artemisia* spp. that are rather distinctive. Most mines are partially along the midrib and have the frass in two alternating lines of pellets. I have reared this Holarctic species from *Artemisia vulgaris* L. in California.

Phytomyza angelicella Frost

Phytomyza angelicella Frost, Ann. Ent. Soc. Amer., vol. 20, p. 218, 1927.

This species and *Phytomyza aquilegiana* belong to the assemblage of species having a yellow frons, dark third antennal segment, mesonotal margins, scutellum, and femora, and the dorsal upper-orbital shorter than the ventral. This species is distinguished from *P. aquilegiana* by having the genovertical plates dark (fig. 140) and relatively few setulae in the intraalar row (six to nine anterior to the suture and about five posterior). The larvae form linear mines in the leaves of *Angelica atropurpurea* in New York.

Phytomyza aquilegiana Frost

Phytomyza aquilegiae (Hardy), Melander (part), Journ. New York Ent. Soc., vol. 21, p. 271, 1913 (1 ♀, Moscow Mountain, Idaho).

Phytomyza bipunctata (Loew) Melander (part), Journ. New York Ent. Soc., vol. 21, p. 271, 1913 (1 ♀, Avon, Idaho).

Phytomyza plumiseta Frost (part), Mem. Cornell Univ. Agr. Exp. Sta., vol. 78, p. 87, 1924 (specimens from *Aquilegia* sp.).

Phytomyza aquilegiana Frost, Ann. Ent. Soc. Amer., vol. 23, p. 459, 1930 (figures of puparium and mined leaves).

The holotype male is in the U. S. National Museum (No. 50023). This is a common species that is similar to *Phytomyza angelicella* in having a yellow frons, dark third antennal segment, mesonotal margins, scutellum, and femora, and the dorsal upper-orbital usually shorter than the ventral (fig. 141). The length of this seta is variable and it varies from as long as the ventral upper-orbital to three-fifths its length. There is usually a very small third lower-orbital and the genovertical plates are yellow (fig. 141). The mesonotum bears four to five rows of acrostichals, and the intraalar row has numerous setulae (10 to 12 anterior to the suture and 13 to 15 posterior to it). The larvae form blotch mines in the leaves of *Aquilegia* spp. and *Thalictrum* spp. I have seen specimens from California, Washington, Idaho, Pennsylvania, and New York.

Phytomyza atricornis Meigen

Phytomyza atricornis Meigen, Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten, vol. 7, p. 404, 1838.—Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 353, 1934 (figures of head and wing).

Phytomyza chrysanthemi Kowarz, *in* Lintner, Report of the State Entomologist, *in* 44th Ann. Rep. New York State Mus., p. 243, 1892.—Smulyan, Massachusetts Agr. Exp. Sta. Bull. 157, p. 21, 1914 (figures of all instars and mined leaves).

This species is probably the most widespread and omnivorous in the Agromyzidae. It has the frons yellow, third antennal segment, mesonotal margins, scutellum, and femora dark, and both upper-orbitals of equal length and strength. The mesofacial plate may be dark or it may be yellow with the subantennal grooves dark. There is only one lower-orbital. The acrostichals are frequently absent but some specimens have one to four. The larvae form serpentine mines in the leaves of many plants. There are 27 larval host plants listed in the table at the end of this paper. Nearly 300 more larval host plants are known in Europe (Hendel, 1934). I have seen reared specimens from California, Oregon, Washington, Massachusetts, and from British Columbia.

Phytomyza atripalpis Aldrich

Phytomyza atripalpis Aldrich, Proc. Ent. Soc. Washington, vol. 31, p. 89, 1929.

This is a moderately large species (2.25 mm. in wing length) that has the frons yellow, the third antennal segment, mesonotal margins, scutellum, forecoxa, and femora dark. The two upper-orbitals are of equal length and strength (fig. 142) and the mesonotum has two

rows of acrostichals. From *Phytomyza dura* this species may be separated by the larger gena (medially two-fifths of the eye height) (fig. 142), about 15 acrostichals, and the wing with M_{1+2} undulating (fig. 143). The larvae mine in the seeds of *Anemone multifida* Poir. Known only from British Columbia.

Phytomyza auricornis Frost

Phytomyza auricornis Frost, Ann. Ent. Soc. Amer., vol. 20, p. 217, 1927.

The holotype female is in the U. S. National Museum (No. 50032). *Phytomyza auricornis* and *P. flavinervis* belong with those species having a yellow frons, dark scutellum and femora, and the third antennal mostly yellow. From *P. flavinervis*, *P. auricornis* can be distinguished by its smaller size (2.5 vs. 3 mm. in wing length), the third antennal segment setulose (fig. 144), and the intraalar row barer (2 to 3 vs. 4 to 6 setulae). Known only from the holotype from New York.

Phytomyza bicolor Coquillett

Phytomyza bicolor Coquillett, Journ. New York Ent. Soc., vol. 10, p. 191, 1902.

A rather large species (3 mm. in wing length) that has a dark frons, antenna, and tarsi, two equal upper-orbitals, and four or five rows of acrostichals. *Phytomyza bicolor* differs from other closely related species by having the abdomen mostly yellow and the intraalar row of acrostichals very setulose, with about 24 anterior to the suture and 12 posterior to the suture. I have seen three specimens, all from New York.

Phytomyza centralis Frost

Phytomyza centralis Frost, Ann. Ent. Soc. Amer., vol. 29, p. 317, 1936.

The holotype male is in the U. S. National Museum (No. 62978). This is a small dark species (about 1.5 mm. in wing length) that has the frons dark, the dorsal upper-orbital small, and with two lower-orbitals. There are at least three setulae in the intraalar row posterior to the transverse suture, and the inner postalar is about one-half as long as the outer; these characters separate this species from *Phytomyza minuscula*. From *P. loewii*, *P. centralis* can be distinguished by its fore-femur being distally brown and the wing having the second costal section about 1.5 times as long as the fourth (fig. 145). The larvae mine the leaves of *Clematis* sp. in Costa Rica.

Phytomyza clemativora Coquillett

Phytomyza clemativora Coquillett, Proc. Ent. Soc. Washington, vol. 12, p. 131, 1910.

A relatively small yellow species with yellow frons and scutellum, dark third antennal segment, and with the mesonotum marked with

reddish brown (fig. 146). The head is rather denuded, but the dorsal upper-orbital is absent (fig. 147). The frons is wider than long. The mesonotum has the setae as shown, with only about seven acrostichals (fig. 146). The wing has R_{2+3} and R_{4+5} straight and very close together and M_{1+2} undulating medially (fig. 148). Known from two males reared from *Clematis* sp. in southern Texas.

***Phytomyza crassiseta* Zetterstedt**

Phytomyza crassiseta Zetterstedt, Diptera Scandinaviae, vol. 14, p. 6469, 1860.—Melander (part), Journ. New York Ent. Soc., vol. 21, p. 271, 1913 (2 ♀ ♀, Mount Constitution, and 1 ♀, Chehalis, Wash.; 1 ♀, Collins, Idaho).—Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 387, 1935 (figures of head and wing).

Phytomyza crassiseta is a Holarctic species that has the frons yellow, all three antennal segments, mesonotal margins, scutellum, and femora dark, and both upper-orbitals of equal length and strength. The mesofacial plate is dark and the forecoxa is distally yellow. Characters that separate *P. crassiseta* from closely related species are the dark first and second antennal segments and the greatly expanded arista. The larvae make serpentine mines in the leaves of *Veronica* spp. I have seen specimens from Washington and Idaho. All are females because this species is parthenogenetic.

***Phytomyza delphiniae* Frost**

Phytomyza delphiniae Frost, Canadian Ent., vol. 60, p. 77, 1928.—Griswold, Journ. Econ. Ent., vol. 21, p. 855, 1928.

The holotype female is in the U. S. National Museum (No. 50024). This species belongs with those species having a yellow frons, dark third antennal segment, scutellum, and femora, and the mesonotum laterally bordered with yellow. *Phytomyza delphinii*, like *P. plumiseta*, has both upper-orbitals of equal length. From *P. plumiseta*, this species may be distinguished by the wide gena (medially about two-fifths the eye height) (fig. 149), the brown tarsi, and the mesonotum dull gray pollinose. The larvae form blotch mines in the leaves of *Delphinium cultorum* Voss. I have seen specimens from Ohio, Pennsylvania, and New York.

***Phytomyza dura* Curran**

Phytomyza dura Curran, 1931, Amer. Mus. Nov., No. 492, p. 10, 1931.

Phytomyza dura has a yellow frons, dark third antennal segment, mesonotal margins, scutellum, forecoxa, and femora. The upper-orbitals are of equal length (fig. 150) and there are two rows of acrostichals. From *P. atripalpis* this species can be distinguished by its smaller gena (medially .30 of the eye height) (fig. 150) and by

having only about 9 acrostichals and vein M_{1+2} straight (fig. 151). I have seen 16 swept specimens from Quebec.

Phytomyza flavicornis Fallén

Phytomyza flavicornis Fallén, Diptera sueciae, vol. 2, No. 41 (Phytomyzides), p. 4, 1823.—Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 402, 1935 (figures of head and wing).

This is a moderately large Holarctic species (2.3 to 2.6 mm. in wing length) that has yellow frons, dark scutellum, and femora mostly yellow. *Phytomyza flavicornis* is distinct from related species by having one upper-orbital and the mesonotum shining black. *P. rufipes* and *P. genalis* have the mesonotum gray pollinose and *P. nervosa* has the third antennal black. The species has not been reared in North America but the larvae mine the pith of stems of *Urtica dioica* L. in Europe. I have seen specimens from Indiana and Michigan.

Phytomyza flavinervis Frost

Phytomyza flavinervis Frost, Mem. Cornell Univ. Agr. Exp. Sta., vol. 78, p. 85, 1924.

The holotype female is in the U. S. National Museum (No. 50022). This is a large species (3 mm. in wing length) that has the frons yellow, scutellum and femora dark, and the third antennal segment yellow. *Phytomyza flavinervis* may be separated from *P. auricornis* by the bare third antennal segment (fig. 152) and the more setulose (4 to 6 vs. 2 to 3) intraalar row posterior to the transverse suture. The two specimens of the type series are all that are known. They are from Texas.

Phytomyza genalis Melander

Phytomyza genalis Melander, Journ. New York Ent. Soc., vol. 21, p. 272, 1913.

A large species (2.75 to 3.25 mm. in wing length) that has the frons yellow, scutellum dark, and the femora mostly yellow. The third antennal segment is yellow and the mesonotum is gray pollinose. The head has the gena extremely wide and the genovertical plates greatly extending beyond the eye margin (fig. 153). From *Phytomyza rufipes*, *P. genalis* may be separated by its anepisternum being more than one-half yellow and with a ventral brown triangle. I have seen specimens only from Illinois.

Phytomyza gregaria Frick

Phytomyza nigritella (Zetterstedt), Melander, Journ. New York Ent. Soc., vol. 21, p. 270, 1913.

Phytomyza obscurella (Fallén), Melander (part), Journ. New York Ent. Soc., vol. 21, p. 270, 1913 (excluding 1 ♀, Bellingham, Wash.).

Phytomyza gregaria Frick, Ann. Ent. Soc. Amer., vol. 47, p. 371, 1954 (figure of leaf mines).

Phytomyza gregaria is one of a group of four species having the frons, antenna, and tarsi dark, the forefemur distally yellow to reddish brown, two equally strong upper-orbitals, and four or five rows of acrostichal setae. It may be separated from *P. periclymeni*, *P. persicae*, and *P. ilicicola* in having the eye ovoid, at most three-fourths the eye height, the mesonotum dull brownish black, and with the acrostichal setae extending posteriorly to the third dorsocentral. The larvae make serpentine mines in the leaves of *Lonicera involucrata* Banks. As many larvae may be in a single leaf, they frequently form a blotch. My specimens are from California, and Melander's are from Washington and Idaho.

***Phytomyza ilicicola* Loew**

Phytomyza ilicis Loew (not Curtis, 1846), Berliner Ent. Zeitschr., vol. 7, p. 54, 1863 (Centuria III, No. 99).

Phytomyza ilicicola Loew, Berliner Ent. Zeitschr., vol. 16, p. 114, 1872 (Centuria x, p. 290).

Phytomyza ilicicola is one of a group of four species having the frons, antenna, and tarsi dark, the forefemur distally yellow to reddish brown, two equally strong upper-orbitals, and four or five rows of acrostichals. It may be separated from *P. gregaria*, *P. periclymeni*, and *P. persicae* in having the forefemur distally yellow, mesonotum brown, dull bluish pollinose, with the acrostichals extending posteriorly to the fourth dorsocentral. From *P. ilicis* this species may be distinguished by the tan to brown frons, the narrow gena that is medially one-fourth to one-fifth the eye height (fig. 154), acrostichals in about four rows, and the second costal section 1.9 to 2.8 times as long as the fourth (fig. 155). The larvae form serpentine mines in the leaves of *Ilex opaca* Ait., *I. glabra* (L.) Gray, *I. decidua* Walt., and *I. vomitoria* Ait. I have seen specimens from Texas, Alabama, South Carolina, Virginia, District of Columbia, West Virginia, New York, Rhode Island, and Massachusetts.

***Phytomyza ilicis* Curtis**

Phytomyza ilicis Curtis, Gardeners' Chron., July 4, 1846, p. 444, 1846.—Downes and Andison, Journ. Econ. Ent., vol. 33, p. 948, 1941.—Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 417, 1935 (figures of head and wing).

The frons is yellow on the dorsal half and grayish black below. Therefore, this species could be considered as belonging to either part of couplet 1 in the key and is so treated in the key. One of the more distinctive characteristics of this species is the six to eight rows of acrostichals. *Phytomyza ilicis* may be separated from *P. ilicicola* by the following characters: frons about one-half yellow, gena medially about one-third the eye height, acrostichals in six to eight rows, and

the second costal section from 3 to 3.8 times as long as the fourth. This is an introduced European species whose larvae make serpentine-blotch mines in the leaves of *Ilex aquifolium* L. Now positively known from Oregon, Washington, and British Columbia.

Phytomyza lactuca Frost

Phytomyza lactuca Frost, Mem. Cornell Univ. Agr. Exp. Sta., vol. 78, p. 85, 1924 (figure of leaf mines); Canadian Ent., vol. 60, p. 77, 1928.—Needham, Frost, and Tothill, Leaf-mining insects, p. 263, 1928 (figure of leaf mine).

This species has the frons yellow and the third antennal segment, mesonotal margins, scutellum, forecoxa, and femora dark. There are two equally strong upper-orbitals and two rows of acrostichals. *Phytomyza lactuca* may be distinguished by the very long setulae on the third antennal segment (fig. 156). The larvae make serpentine mines in the leaves of *Lactuca scariola* var. *integrifolia* (Bogenh.) G. Beck. I have seen specimens from Michigan, New York, and Pennsylvania.

Phytomyza loewii Hendel

Phytomyza clematidis Loew (*not* Kaltenbach, 1859), Berliner Ent. Zeitschr., vol. 7, p. 55, 1863 (Centuria III, No. 100).

Phytomyza loewii Hendel, Konowia, vol. 2, p. 145, 1923.

Phytomyza nitida Melander (part), Journ. New York Ent. Soc., vol. 21, p. 271, 1913 (1 ♀, White Plains, N. Y.; 2 ♂♂, Troy and Bovill, Idaho).

This is a shining dark brown species with the frons dark, the dorsal upper-orbital very small, and the eye ovoid and about two-thirds as wide as high (fig. 157). It is distinguished from *Phytomyza minuscula* by the three setulae in the intraalar row posterior to the transverse suture and the inner postalar being at least one-half as long as the outer. *P. loewii* is close to *P. centralis* but is different in having the forefemur distally yellow and the second costal section of the wing at least twice as long as the fourth (fig. 158). The larvae make serpentine mines in the leaves of *Clematis* spp. and I have reared it from *Clematis ligusticifolia* Nutt. in Washington. I have seen specimens from Washington, Idaho, Indiana, District of Columbia, and Louisiana.

Phytomyza major Malloch

Phytomyza major Malloch, Proc. U. S. Nat. Mus., vol. 46, p. 150, 1913.

This is a large species (3.75 mm. in wing length) that is mostly yellow with the frons and scutellum yellow. The antennae are entirely yellow and the mesonotum has four brown vittae between the rows of setae, two between the dorsocentral rows. Both known specimens are teneral females from Labrador.

***Phytomyza marginalis* Frost**

Phytomyza marginalis Frost, Ann. Ent. Soc. Amer., vol. 20, p. 219, 1927.

The holotype female is in the U. S. National Museum (No. 50030). This species and *Phytomyza melanella* are similar in having dark frons, antenna, and tarsi, two equal-sized upper-orbitals, and the acrostichals in two rows. From *P. melanella* this species can be distinguished by having the third antennal segment subquadrate, the genovertical plates moderately extending beyond the eye margin (fig. 159), and the first and second dorsocentrals equidistant from the transverse suture. Known from two specimens from New York.

***Phytomyza melanella* Frost**

Phytomyza melanella Frost, Mem. Cornell Univ. Agr. Exp. Sta., vol. 78, p. 86, 1924 (figure of wing).

The holotype male is in the U. S. National Museum (No. 50026). This species and *Phytomyza marginalis* are quite similar in having the frons, antenna, and tarsi dark, both upper-orbitals of equal length, and two rows of acrostichals. *P. melanella* has the third antennal segment rounded and the genovertical plates hardly extending beyond the eye margin (fig. 160). Also, the first dorsocentral is about twice as far from the transverse suture as the second. I hereby restrict this species to California. The specimen labeled as a paratype from Kentucky is in very poor condition and is of another species.

***Phytomyza minuscula* Goureau**

Phytomyza minuscula Goureau, Ann. Soc. Ent. France, ser. 2, vol. 9, p. 154, 1851.—Frost, Ann. Ent. Soc. Amer., vol. 23, p. 457, 1930 (figures of puparium and leaf mines).—Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 433, 1935 (figures of head and wing).

Phytomyza nitida Melander, Journ. New York Ent. Soc., vol. 21, p. 271, 1913.

Phytomyza aquilegia (Hardy), Coquillett (part), U. S. Dep. Agr., Div. Ent. Bull. 10, p. 78, 1898 (specimens from *Aquilegia* sp.)—Melander (part), Journ. New York Ent. Soc., vol. 21, p. 271, 1913 (2 ♂♂, Ithaca, N. Y., and New Haven, Conn.).—Cory, Journ. Econ. Ent., vol. 9, p. 419, 1916 (figures of leaf mines).—Frost (part), Mem. Cornell Univ. Agr. Exp. Sta., vol. 78, p. 67, 1924 (figure of leaf mines).

Phytomyza minuscula is a small dark Holarctic species (1.5 to 2 mm. in wing length) that has the frons dark. The dorsal upper-orbital is minute and the ventral lower-orbital is about one-half the size of the dorsal (fig. 161). This species is characterized by there not being more than one setula in the intraalar row posterior to the transverse suture and the inner postalar usually absent. The fourth costal section varies from 2 to 3.4 times as long as the fourth costal. The head has the eye relatively small and the antenna large (fig. 161).

The larvae form serpentine mines in the leaves of *Aquilegia* spp. and *Thalictrum* spp. I have reared it from *Aquilegia*, cultivated variety; *A. truncata* F. & M.; *A. pauciflora* Jepson; *Thalictrum*, cultivated variety; and *T. fendleri* Engelm. I have studied specimens from California, Washington, Idaho, Illinois, Indiana, District of Columbia, and Connecticut.

***Phytomyza nervosa* Loew**

Phytomyza nervosa Loew, Berliner Ent. Zeitschr., vol. 13, p. 52, 1869 (Centuria VIII, No. 99).

The holotype female is in the Museum of Comparative Zoology (No. 13432). This species, together with several other species, has a yellow frons, dark scutellum, and femora primarily yellow. The third antennal segment is black, a character which separates *Phytomyza nervosa* from the other species. There are no acrostichals. The wing is relatively wide for its length and M_{1+2} has a distinct curve outwardly (fig. 162). I have seen specimens from Iowa, Kansas, and District of Columbia.

***Phytomyza nigra* Meigen**

Phytomyza nigra Meigen, Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten, vol. 6, p. 191, 1830.—Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 436, 1935 (figures of head and wing).

This Holarctic species is unusual in having the eye setulose. It also has a yellow frons and dark third antennal segment, mesonotal margins, scutellum and femora. Both upper-orbital setae are of equal length and strength and the acrostichals are in two rows. The larvae make linear mines at the tips of leaves of *Bromus tectorum* L., *Festuca arundinacea* Schreb., *F. rubra* var. *commutata* Gaud., *Hordeum jubatum* L., *Lolium perenne* L., and *Triticum aestivum* L. I have seen specimens from Oregon and Washington reared from the grasses listed here.

***Phytomyza nigrinervis* Frost**

Phytomyza nigrinervis Frost, Mem. Cornell Univ. Agr. Exp. Sta., vol. 78, p. 87, 1924.

The holotype male is in the U. S. National Museum (No. 50028). This is the darkest species among those species having a dark frons, antenna, and tarsi, two equally strong upper-orbitals, and the acrostichals in four or five rows. The head is distinctively shaped (fig. 163) and is totally brown or black. The femora are not lighter colored distally and the basal wing veins are black. The entire type series is from Colorado.

***Phytomyza nigripennis* Fallén**

Phytomyza nigripennis Fallén, Diptera sueciae, vol. 2, No. 41 (Phytomyzides), p. 2, 1823.—Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 439, 1935 (figures of head and wing).

Phytomyza clematidis (Loew), Melander, Journ. New York Ent. Soc., vol. 21, p. 269, 1913.

This is a shining black species having the frontal vitta brown, the femora distally reddish with the forefemur more yellowish, the calypter with yellow margin and fringe, and the wing strongly tinged brown. *Phytomyza nigripennis* is a large species (wing length not less than 3 mm.) having one upper-orbital and three lower-orbitals. I have seen specimens of this Holarctic species from Wisconsin and Ontario.

***Phytomyza periclymeni* de Meijere**

Phytomyza ilicicola (Loew), Melander (part), Journ. New York Ent. Soc., vol. 21, p. 270, 1913 (1 ♂, 1 ♀, Oroville, Wash.).

Phytomyza nigra (Meigen), Melander (part), Journ. New York Ent. Soc., vol. 21, p. 270, 1913 (1 ♂, Oroville, Wash.).

Phytomyza periclymeni de Meijere, *in* Hendel, Wiener Ent. Zeitschr., vol. 39, p. 71, 1922.—Hendel, *in* Lindner, Die Fliegen der palearktischen Region, fam. 59, p. 452, 1935 (figures of head and wing).—Frick, Ann. Ent. Soc. Amer., vol. 47, p. 373, 1954.

This Holarctic species is one of a group of four species having the frons, antenna, and tarsi dark, the forefemur distally yellow to reddish brown, two equally strong upper-orbitals, and four or five rows of acrostichal setae. *Phytomyza periclymeni* may be separated from *P. gregaria, P. persicae*, and *P. ilicicola* in having the eye subcircular and the mesonotum dull bluish black with the acrostichal setae extending posteriorly to the third dorsocentral. The larvae make blotch mines in the leaves of *Symphoricarpos* spp. and *Lonicera* spp. I have seen specimens from Washington and California.

***Phytomyza persicae* Frick**

Phytomyza nigritella (Zetterstedt), Frost, Mem. Cornell Univ. Agr. Exp. Sta., vol. 78, p. 81, 1924 (figure of leaf mine).

Phytomyza persicae Frick, Ann. Ent. Soc. Amer., vol. 47, p. 369, 1954.

Phytomyza persicae is one of a group of four species having the frons, antenna, and tarsi dark, the forefemur distally yellow to reddish brown, two equally strong upper-orbitals, and four or five rows of acrostichal setae. It may be separated from *P. gregaria, P. periclymeni*, and *P. ilicicola* in having the forefemur distally reddish brown, the mesonotum black, dull gray pollinose, and the acrostichals extending posteriorly to the fourth dorsocentral. The larvae make serpentine mines in the leaves of *Prunus persica* L. I have not seen

Frost's specimens from *Prunus serotina* Ehrh. and *Diervilla lonicera*, so I restrict the species to peach at this time. I have seen specimens from Ohio, Virginia, Connecticut, and Ontario.

Phytomyza plantaginis Robineau-Desvoidy

Phytomyza plantaginis Robineau-Desvoidy, Rev. Mag. Zool., ser. 2, vol. 3, p. 404, 1851.—Frost, Mem. Cornell Univ. Agr. Exp. Sta., vol. 78, p. 82, 1924 (figure of leaf mine).—Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 455, 1935 (figures of head and wing).

Phytomyza genualis Loew, Berliner Ent. Zeitschr., vol. 13, p. 52, 1869 (Centuria VIII, No. 100).

Phytomyza crassiseta (Zetterstedt), Melander (part), Journ. New York Ent. Soc., vol. 21, p. 271, 1913 (2 ♀ ♀, White Plains, N. Y., and Collins, Idaho.).

This species has the frons and first and second antennal segments yellow, the third antennal segment, mesonotal margins, scutellum, and femora dark, and the forecoxa distally yellow. There are two equally strong upper-orbitals and two rows of acrostichals. It differs from *Phytomyza subtenella* in having only one strong lower-orbital and the lack of an inner postalar. The larvae make serpentine mines in the leaves of *Plantago* spp. I have seen this Holarctic species from many widely scattered States throughout the United States.

Phytomyza plumiseta Frost

Phytomyza plumiseta Frost, Mem. Cornell Univ. Agr. Exp. Sta., vol. 78, p. 87, 1924; Ann. Ent. Soc. Amer., vol. 23, p. 460, 1930.

The holotype female is in the U. S. National Museum (No. 50027). *Phytomyza plumiseta* belongs to the assemblage of species that has a yellow frons, dark third antennal segment, scutellum, and femora, and the mesonotum bordered with yellow. Like *P. delphinii*, this species has both upper-orbitals of equal length and strength. *P. plumiseta* has a narrow gena (medially about one-eighth the eye height) (fig. 164), the tarsi yellow, and the mesonotum subshining. The wing is illustrated to show the undulating R_{2+3} and straight M_{1+2} (fig. 165). The larvae make blotch mines in the leaves of *Thalictrum polygamum* Muhl. and other *Thalictrum* spp. in Pennsylvania.

Phytomyza ranunculi (Schrank)

Musca ranunculi Schrank, Fauna Boica, vol. 3, p. 140, 1803.

Phytomyza ranunculi (Schrank), Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 463, 1935 (figures of head and wing).—Hering, Entomon, vol. 1, p. 207, 1949.

This species is one in a group of species having a yellow frons and scutellum and dark third antennal segment. The dorsal upper-orbital is definitely shorter than the ventral. Hendel (1935) proposed several varieties in order to distinguish the seasonal color phases of

this Holarctic species, but he could find no morphological differences between the color phases, even in the male terminalia. Hering (1949) offered a key to subspecies based in part upon morphological differences. Several of the color phases considered by Hendel are known in North America and a key for their separation is presented here (all three subspecies have the mesonotum grayish black with yellow vittae).

1. Mesonotum without a yellow prescutellar area 2
   Mesonotum with a yellow prescutellar area . . . . . **ranunculi albipes**
2. Femora mostly yellow; anepisternum about one-half yellow.
   ranunculi flavoscutellata
   Femora black or brown; anepisternum about one-third yellow.
   ranunculi praecox

The larvae form serpentine mines in the leaves of *Ranunculus* spp. and *Anemone nemorosa* L. in Europe. No host plants are known from North America.

Phytomyza ranunculi albipes Meigen

Phytomyza albipes Meigen, Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten, vol. 6, p. 195, 1830.
Phytomyza flava (Fallén), Melander, Journ. New York Ent. Soc., vol. 21, p. 270, 1913.

This subspecies is known from three specimens from Washington.

Phytomyza ranunculi flavoscutellata Fallén

Phytomyza flavoscutellata Fallén, Diptera sueciae, vol. 2, No. 41 (Phytomizides), p. 4, 1823.—Melander (part), Journ. New York Ent. Soc., vol. 21, p. 270, 1913 (4 ♂ ♂, Portland, Oreg., and Moscow Mountain, Idaho).
Phytomyza zetterstedti (Schiner), Melander (part), Journ. New York Ent. Soc., vol. 21, p. 270, 1913 (1 ♀, Moscow Mountain, Idaho).

There are five specimens in Melander's collection from Oregon and Idaho.

Phytomyza ranunculi praecox Meigen

Phytomyza rufipes Meigen, Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten, vol. 6, p. 194, 1830.
Phytomyza flavoscutellata (Fallén), Melander (part), Journ. New York Ent. Soc., vol. 21, p. 270, 1913 (1 ♀, Moscow Mountain, Idaho).

At present known from one specimen in Melander's collection from Idaho.

Phytomyza rufipes Meigen

Phytomyza rufipes Meigen, Systematische Beschreibung der bekannten europäischen zweiflügeligen Insekten, vol. 6, p. 192, 1830.—Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 471, 1935 (figures of head and wing).

Another rather large Holarctic species with yellow frons, dark scutellum, and mostly yellow femora. The third antennal segment is

yellow and the mesonotum dull gray pollinose. This species is most closely related to *Phytomyza genalis* but may be separated by *P. rufipes* having the anepisternum three-fourths dull gray. The larvae make serpentine mines in the leaves of various crucifers in Europe. The seven North American specimens that I have seen were from central Oregon.

***Phytomyza sphondylii* Robineau-Desvoidy**

Phytomyza spondylii Robineau-Desvoidy, Rev. Mag. Zool., ser. 2, vol. 3, p. 400, 1851.

Phytomyza sphondylii Robineau-Desvoidy, Hendel, *in* Lindner, Die Fliegen der palaearktischen Region, fam. 59, p. 483, 1935 (figures of head and wing).

Since this Holarctic species was named for the first known larval host plant, *Heracleum sphondylium* L., the proper spelling should be *sphondylii* and not *spondylii* as originally proposed. *Phytomyza sphondylii* is very similar to *P. albiceps* in having a yellow frons, dark third antennal segment, scutellum, and femora, and the mesonotum bordered with yellow. From *P. albiceps* this species is distinguished by the two developed upper-orbital setae (although the dorsal is shorter than the ventral) and the anepisternum being three-fourths dark. I have reared this species from serpentine mines in the leaves of *Heracleum lanatum* Michx. in California.

***Phytomyza subtenella* Frost**

Phytomyza subtenella Frost, Mem. Cornell Univ. Agr. Exp. Sta., vol. 78, p. 89, 1924.

The holotype female is in the U. S. National Museum (No. 50021). This species has the frons yellow, the third antennal segment, mesonotal margins, scutellum, and femora dark, and the forecoxa distally yellow. The upper-orbitals are equally strong and the acrostichals are in two rows. From *Phytomyza crassiseta* this species can be separated by its having the first and second antennals yellow, the arista not greatly expanded, and two strong lower-orbitals (fig. 166). From *P. plantaginis* this species differs in having two strong lower-orbitals and an inner postalar seta. The wing has M_{1+2} undulating and the anal vein straight (fig. 167). At present known from two specimens from Washington and Wisconsin.

***Phytomyza trivittata* Frost**

Phytomyza trivittata Frost, Mem. Cornell Univ. Agr. Exp. Sta., vol. 78, p. 89, 1924.

This is a species of moderate size (1.75 mm. in wing length) with yellow frons and scutellum and a dark third antennal segment. The head is mostly yellow and has both upper-orbitals of equal length and strength (fig. 168). The wing has the radial sector strongly curved

forward (fig. 169). The mesonotum is marked with dull black and gray pollinose and is without setulae other than about four on either side anterior to the transverse suture (fig. 170). There are three known specimens: the type from Wells, Nev., and two specimens from the San Jacinto Mountains, Calif.

Host Plants of North American Agromyzid Larvae

(Species of Agromyzidae in italic. Plant names in parentheses are known larval hosts in Europe; to date no such host plant, or not more than one, has been reported in North America for each of the species of Agromyzidae so indicated.)

Pteridophyta
- Polypodiaceae
  - Asplenium pinnatifidum Nutt.: *Liriomyza felti* (Malloch)
  - (Asplenium rutamuraria L.): *Liriomyza lutea* (Meigen)
  - Camptosorus rhizophyllus (L.) Link: *Liriomyza felti* (Malloch)
  - Pteridum aquilinum (L.) Kuhn: *Phytobia* (*Praspedomyza*) *clara* (Melander)

Spermatophyta
- Angiospermae
  - Monocotyledoneae
    - Typhaceae
      - Typha spp.: *Phytobia* (*Dizygomyza*) *thompsoni* Frick
      - (Typha latifolia L.): *Phytobia* (*Dizygomyza*) *iraeos* (Robineau-Desvoidy)
    - Gramineae
      - Festuceae
        - Bromus carinatus Hook. & Arn.: *Cerodontha* (*Cerodontha*) *dorsalis* (Loew), *Liriomyza flaveola* (Fallén)
        - Bromus tectorum L.: *Phytobia* (*Poëmyza*) *incisa* (Meigen), *Phytomyza nigra* Meigen
        - Dactylis glomerata L.: *Cerodontha* (*Cerodontha*) *dorsalis* (Loew)
        - Eragrostis sp.: *Cerodontha* (*Cerodontha*) *dorsalis* (Loew)
        - Festuca arundinacea Schreb.: *Phytomyza nigra* Meigen
        - Festuca rubra var. commutata Gaud.: *Phytomyza nigra* Meigen
        - Poa pratensis L.: *Cerodontha* (*Cerodontha*) *dorsalis* (Loew)
      - Hordeae
        - Agropyron repens (L.) Beauv.: *Agromyza niveipennis* Zetterstedt, *Phytobia* (*Poëmyza*) *incisa* (Meigen), *P.* (*P.*) *muscina* (Meigen), *Cerodontha* (*Cerodontha*) *dorsalis* (Loew), *Pseudonapomyza atra* (Meigen)
        - Agropyron sp.: *Phytobia* (*Poëmyza*) *inconspicua* (Malloch)
        - Elymus canadensis L.: *Phytobia* (*Poëmyza*) *lateralis* (Macquart)
        - E. glaucus Buckl.: *Phytobia* (*Poëmyza*) *incisa* (Meigen), *Cerodontha* (*Cerodontha*) *dorsalis* (*Loew*)
        - Hordeum jubatum L.: *Agromyza niveipennis* Zetterstedt, *Phytobia* (*Poëmyza*) *lateralis* (Macquart), *Cerodontha* (*Cerodontha*) *dorsalis* (Loew), *Pseudonapomyza atra* (Meigen), *Phytomyza nigra* Meigen
        - H. murinum L.: *Phytobia* (*Poëmyza*) *muscina* (Meigen), *Cerodontha* (*Cerodontha*) *dorsalis* (Loew), *Liriomyza flaveola* (Fallén)
        - H. vulgare L.: *Phytobia* (*Poëmyza*) *incisa* (Meigen), *Cerodontha* (*Cerodontha*) *dorsalis* (Loew)

(Hordeum vulgare L.): *Agromyza ambigua* Fallén
Lolium multiflorum Lam.: *Phytobia* (*Poëmyza*) *muscina* (Meigen), *Cerodontha* (*Cerodontha*) *dorsalis* (Loew), *Liriomyza flaveola* (Fallén)
L. perenne L.: *Phytomyza nigra* Meigen
Lolium sp.: *Liriomyza flavcola* (Fallén)
Secale cereale L.: *Agromyza niveipennis* Zetterstedt, *Cerodontha* (*Cerodontha*) *dorsalis* (Loew), *Pseudonapomyza atra* (Meigen)
Triticum aestivum L. (including T. sativum Lam. and T. vulgare Vill.): *Agromyza nigripes* Meigen, *A. niveipennis* Zetterstedt, *Phytobia* (*Poëmyza*) *incisa* (Meigen), *P.* (*P.*) *lateralis* (Macquart), *Cerodontha* (*Cerodontha*) *dorsalis* (Loew), *Phytomyza nigra* Meigen

Aveneae
Avena sativa L.:*Phytobia* (*Poëmyza*) *lateralis* (Macquart)

Agrostidae
Agrostis alba L.: *Phytobia* (*Poëmyza*) *incisa* (Meigen)
(Calamagrostis epigeios (L.) Roth): *Agromyza ambigua* Fallén
Phleum pratense L.: *Phytobia* (*Poëmyza*) *incisa* (Meigen), *Cerodontha* (*Cerodontha*) *dorsalis* (Loew)

Chlorideae
Eleusine indica (L.) Gaertn.: *Cerodontha* (*Cerodontha*) *dorsalis* (Loew)

Phalaridae
Ehrharta erecta Lam.: *Phytobia* (*Poëmyza*) *muscina* (Meigen), *Cerodontha* (*Cerodontha*) *dorsalis* (Loew)
Phalaris arundinacea L.: *Phytobia* (*Poëmyza*) *incisa* (Meigen)
P. minor Retz.: *Cerodontha* (*Cerodontha*) *dorsalis* (Loew)

Paniceae
Digitaria sanguinalis (L.) Scop.: *Cerodontha* (*Cerodontha*) *dorsalis* (Loew)
Echinochloa crusgalli (L.) Beauv.: *Phytobia* (*Poëmyza*) *muscina* (Meigen), *Cerodontha* (*Cerodontha*) *dorsalis* (Loew)
Panicum capillare L.: *Cerodontha* (*Cerodontha*) *dorsalis* (Loew)
P. dichotomiflorum Michx.: *Cerodontha* (*Cerodontha*) *dorsalis* (Loew)
P. miliacum L.: *Cerodontha* (*Cerodontha*) *dorsalis* (Loew)
Paspalum dilatatum Poir.: *Liriomyza marginalis* (Malloch)
Setaria lutescens (Weigel) Hubb.: *Phytobia* (*Poëmyza*) *incisa* (Meigen)
S. viridis (L.) Beauv.: *Cerodontha* (*Cerodontha*) *dorsalis* (Loew)

Andropogoneae
Sorghum vulgare Purs.: *Cerodontha* (*Cerodontha*) *dorsalis* (Loew)

Tripsaceae
Zea mays L.: *Agromyza parvicornis Loew*, *Phytobia* (*Poëmyza*) *incisa* (Meigen), *P.* (*P.*) *lateralis* (Macquart)

Cyperaccae
(Carex spp.): *Phytobia* (*Poëmyza*) *angulata* (Loew), *P.* (*Dizygomyza*) *luctuosa* (Meigen), *P.* (*D.*) *morosa* (Meigen)
(Scirpus maritimus L.): *Phytobia* (*Dizygomyza*) *morosa* (Meigen)

Commelinaceae
Commeline elegans H. B. K.: *Liriomyza commelinae* (Frost)
C. longicaulis Jacq.: *Liriomyza commelinae* (Frost)
C. virginica L.: *Liriomyza commelinae* (Frost)

Juncaceae
(Juncus effusus L.): *Phytobia* (*Dizygomyza*) *luctuosa* (Meigen)
Juncus xiphioides Meyer: *Phytobia* (*Icteromyza*) *longipennis* (Loew)
(Juncus sp.): *Phytobia* (*Icteromyza*) *capitata* (Zetterstedt)
Liliceae
Allium cepa L.: *Liriomyza alliovora* Frick, *L. langei* Frick
Asparagus officinalis L.: *Melanagromyza simplex* (Loew)
Iridaceae
Iris versicolor L.: *Phytobia* (*Dizygomyza*) *thompsoni* Frick
Iris spp.: *Phytobia* (*Dizygomyza*) *thompsoni* Frick, *P.* (*D.*) *iraeos* (Robineau-Desvoidy), *P.* (*D.*) *iridis* (Hendel)
Dicotyledoneae
Salicaceae
Populus deltoides Marsh: *Agromyza albitarsis* Meigen, *Phytagromyza populicola* (Walker)
P. nigra var. italica Muenchh.: *Agromyza albitarsis* Meigen
P. trichocarpa T. & G.: *Agromyza albitarsis* Meigen
Populus spp.: *Agromyza albitarsis* Meigen, *Melanagromyza schineri* (Giraud)
Salix lasiandra Benth.: *Agromyza albitarsis* Meigen
Salix spp.: *Melanagromyza salicis* (Malloch)
(Salix spp.): *Melanagromyza schineri* (Giraud)
Betulaceae
Betula nigra L.: *Phytobia* (*Phytobia*) *pruinosa* (Coquillett)
Fagaceae
Quercus spp.: *Agromyza viridula* Coquillett
Ulmaceae
Celtis occidentalis Micocoulier: *Agromyza aristata* Malloch
Ulmus americana L.: *Agromyza aristata* Malloch
Urticaceae
Urtica californica Greene: *Agromyza reptans* Fallén
(Urtica dioica L.): *Phytomyza flavicornis* Fallén
Chenopodiaceae
Beta vulgaris L.: *Liriomyza langei* Frick
Chenopodium album L.: *Haplomyza minuta* (Frost)
(Chenopodium album L.): *Phytobia* (*Amauromyza*) *abnormalis* (Malloch)
Spinacia oleracea L.: *Liriomyza langei* Frick
Amaranthaceae
Amaranthus hybridus L.: *Haplomyza togata* (Melander)
A. retroflexus L.: *Haplomyza togata* (Melander)
Amaranthus sp.: *Phytobia* (*Amauromyza*) *abnormalis* (Malloch)
Caryophyllaceae
Dianthus caryophyllus L.: *Liriomyza dianthi* Frick
Portulacaceae
Portulaca sp.: *Haplomyza palliata* (Coquillett)
Ranunculaceae
Anemone multifida Poir.: *Phytomyza atripalpis* Aldrich
(Anemone nemorosa L.): *Phytomyza ranunculi* (Schrank)
Aquilegia canadensis L.: *Phytomyza aquilegiana* Frost
A. truncata F. & M.: *Phytomyza aquilegiana* Frost, *P. minuscula* Goureau

A. truncata var. pauciflora Jepson: *Phytomyza aquilegiana* Frost, *P. minuscula* Goureau
A. vulgaris L.: *Phytomyza aquilegiana* Frost
Aquilegia spp., cult. vars.: *Phytomyza aquilegiana* Frost, *P. minuscula* Goureau
Clematis ligusticifolia Nutt.: *Phytomyza loewii* Hendel
Clematis spp.: *Phytomyza centralis* Frost, *P. clemativora* Coquillett, *P. loewii* Hendel
Delphinium cultorum Voss.: *Phytomyza delphiniae* Frost
Ranunculus abortivus L.: *Napomyza davisii* (Walton)
Ranunculus sp.: *Napomyza davisii* (Walton)
(Ranunculus spp.): *Phytomyza ranunculi* (Schrank)
Thalictrum fendleri Engelm.: *Phytomyza aquilegiana* Frost, P. *minuscula* Goureau
T. polygamum Muhl.: *Phytomyza aquilegiana* Frost, *P. plumiseta* Frost
Thalictrum spp., cult. vars.: *Phytomyza minuscula* Goureau

Cruciferae

(Armoracia lapathifolia Gilib.): *Phytomyza rufipes* Meigen
Brassica arvensis (L.) B. S. P.: *Liriomyza brassicae* (Riley)
B. campestris L.: *Liriomyza brassicae* (Riley)
B. napus L.: *Liriomyza brassicae* (Riley)
(Brassica napus L.): *Phytomyza rufipes* Meigen
Brassica nigra (L.) Koch.: *Liriomyza brassicae* (Riley)
(Brassica oleracea L.): *Phytomyza rufipes* Meigen
Brassica oleracea var. botrytis L.: *Liriomyza brassicae* (Riley), *L. langei* Frick
B. oleracea var. capitata L.: *Liriomyza brassicae* (Riley)
Brassica rapa L.: *Liriomyza brassicae* (Riley)
Descurainia (=Sophia) sp.: *Ophiomyia texana* (Malloch)
(Diplotaxis tenuifolia L.): *Phytomyza rufipes* Meigen
Erysimum inconspicuum (S. Wats.) MacM.: *Liriomyza brassicae* (Riley)
Radicula palustris Moench.: *Liriomyza brassicae* (Riley)
Raphanus sativus L.: *Liriomyza brassicae* (Riley)
R. activus var. longipinnatus Bailey: *Liriomyza brassicae* (Riley)
Rorippa sp.: *Ophiomyia texana* (Malloch)
Sisymbrium altissimum L.: *Liriomyza brassicae* (Riley)

Rosaceae

Amelanchier canadensis (L.) Medic.: *Phytobia* (*Phytobia*) *amelanchieris* (Greene)
Fragaria virginiana Duch.: *Agromyza spiraeae* Kaltenbach
Fragaria spp., cult. vars.: *Agromyza spiraeae* Kaltenbach
(Potentilla erecta L.): *Agromyza rubi* Brischke
Prunus avium L.: *Phytobia* (*Phytobia*) *pruni* (Grossenbacher)
P. domestica L.: *Phytobia* (*Phytobia*) *pruni* (Grossenbacher)
P. persica (L.) Batsch.: *Phytomyza persicae* Frick
? P. serotina Ehrh.: *Phytomyza persicae* Frick
Rubus idaeus L.: *Agromyza spiraeae* Kaltenbach
R. occidentalis L.: *Agromyza spiraeae* Kaltenbach
Rubus spp., cult. vars.: *Agromyza spiraeae* Kaltenbach
(Rubus spp.): *Agromyza rubi* Brischke
(Sanguisorba officinalis L.): *Agromyza rubi* Brischke

Leguminosae
- Baptisia tinctoria (L.) R. Br.: *Liriomyza baptisiae* (Frost)
- Cassia bacillaris L.: *Phytobia* (*Calycomyza*) *cassiae* (Frost)
- Centrosema pubescens Benth.: *Agromyza centrosemae* Frost
- Gliricidia sepium (Jacq.) Steud.: *Liriomyza schmidti* Aldrich
- Medicago lupulina L.: *Liriomyza pictella* (Thomson)
- M. sativa L.: *Melanagromyza gibsoni* (Malloch), *Liriomyza pictella* (Thomson), *L. trifolii* (Burgess)
- Melilotus alba Desr.: *Liriomyza trifolii* (Burgess)
- M. indica All.: *Liriomyza trifolii* (Burgess), *Phytomyza atricornis* Meigen
- Phaseolus limensis Macfad.: *Agromyza inaequalis* Malloch, *Liriomyza phaseolunata* (Frost), *L. pictella* (Thomson)
- P. vulgaris L.: *Liriomyza pictella* (Thomson)
- Pisum sativum L.: *Liriomyza langei* Frick, *Phytomyza atricornis* Meigen
- Trifolium hybridum L.: *Liriomyza trifolii* (Burgess)
- T. repens L.: *Liriomyza trifolii* (Burgess)
- Vicia gigantea Hook: *Liriomyza pictella* (Thomson)
- V. villosa Roth: *Liriomyza trifolii* (Burgess)
- Vigna repens Baker: *Agromyza inaequalis* Malloch

Tropaeolaceae
- Tropaeolum spp.: *Liriomyza brassicae* (Riley)

Euphorbiaceae
- Croton billbergianus Muell.: *Melanagromyza crotonis* (Frost)
- ? Sauvia sp.: *Phytobia* (*Calycomyza*) *allecta* (Melander)

Aquifoliaceae
- Ilex aquifolium L.: *Phytomyza ilicis* Curtis
- I. decidua Walt.: *Phytomyza ilicicola* Loew
- I. glabra (L.) Gray: *Phytomyza ilicicola* Loew
- I. opaca Ait.: *Phytomyza ilicicola* Loew
- I. vomitoria Ait.: *Phytomyza ilicicola* Loew

Aceraceae
- Acer rubrum L.: *Phytobia* (*Phytobia*) *setosa* (Loew)

Tiliaceae
- Tilia americana L.: *Melanagromyza tiliae* (Couden)

Malvaceae
- Abutilon theophrasti Medic.: *Phytobia* (*Calycomyza*) *malvae* (Burgess)
- Althaea rosea Cav.: *Phytobia* (*Calycomyza*) *malvae* (Burgess)
- Gossypium spp.: *Liriomyza pictella* (Thomson)
- Malva nicaeensis All. (=borealis): *Liriomyza pictella* (Thomson), *Phytomyza atricornis* Meigen
- M. rotundifolia L.: *Phytobia* (*Calycomyza*) *malvae* (Burgess)
- Malvastrum coromandelianum L.: *Phytobia* (*Calycomyza*) *malvae* (Burgess)
- Sida spinosa L.: *Phytobia* (*Calycomyza*) *malvae* (Burgess)

Umbelliferae
- Angelica atropurpurea L.: *Melanagromyza angelicae* (Frost), *Phytomyza angelicella* Frost
- Apium graveolens var. dulce Pers.: *Liriomyza langei* Frick
- Heracleum lanatum Michx.: *Phytomyza sphondylii* Robineau-Desvoidy

Cornaceae

Cornus californica C. A. Mey.: *Phytomyza agromyzina* Meigen

C. stolonifera Michx.: *Phytomyza agromyzina* Meigen

Convolvulaceae

Ipomoea batatas Poir.: *Melanagromyza caerulea* (Malloch), *Phytobia* (*Calycomyza*) *ipomoeae* (Frost)

I. laconosa L.: *Melanagromyza caerulea* (Malloch)

I. sinuata Ort.: *Melanagromyza caerulea* (Malloch)

Ipomoea spp.: *Melanagromyza caerulea* (Malloch)

Boraginaceae

Cynoglossum virginianum L.: *Phytobia* (*Calycomyza*) *cynoglossi* Frick

Cynoglossum spp.: *Phytobia* (*Calycomyza*) *cynoglossi* Frick

Verbenaceae

Lantana camara L.: *Ophiomyia lantanae* (Froggatt), *Phytobia* (*Calycomyza*) *lantanae* Frick

Lantana spp.: *Ophiomyia lantanae* (Froggatt), *Phytobia* (*Calycomyza*) *lantanae* Frick

Lippia helleri Britt.: *Phytobia* (*Calycomyza*) *lantanae* Frick

Verbena hybrida Voss.: *Phytobia* (*Calycomyza*) *verbenae* (Hering)

V. noemexicana (Gray) Small: *Phytobia* (*Calycomyza*) *verbenae* (Hering)

V. wrightii Gray: *Phytobia* (*Calycomyza*) *verbenae* (Hering)

Verbena sp.: *Liriomyza verbenicola* Hering

Labiatae

Mentha sp.: *Phytomyza atricornis* Meigen

Nepeta cataria L.: *Ophiomyia proboscidea* (Strobl)

Stachys bullata Benth.: *Liriomyza pictella* (Thomson), *Phytomyza atricornis* Meigen

Solanaceae

Datura meteloides DC.: *Liriomyza munda* Frick, *L. pictella* (Thomson)

Lycopersicon esculentum Mill.: *Liriomyza munda* Frick

Petura sp.: *Liriomyza langei* Frick

Solanum tuberosum L.: *Liriomyza munda* Frick

Scrophulariaceae

Penstemon procerus Dougl.: *Phytobia* (*Calycomyza*) *humeralis* (von Roser)

Veronica peregrina var. xalapensis (H. B. K.) Pennell: *Phytomyza crassiseta* Zetterstedt

Bignoniaceae

Catalpa bignonioides Walt.: *Phytobia* (*Trilobomyza*) *pleuralis* (Malloch)

Acanthaceae

Justicia (=Dianthera) americana (L.) Vahl.: *Melanagromyza dianthereae* (Malloch)

Plantaginaceae

Plantago lanceolata L.: *Phytomyza plantaginis* Robineau-Desvoidy

P. major L.: *Liriomyza sorosis* (*Williston*), *Phytomyza plantaginis*. Robineau-Desvoidy

P. media L.: *Liriomyza sorosis* (Williston)

Plantago sp.: *Liriomyza sorosis* (Williston)

Rubiaceae
- Galium aparine L.: *Phytobia* (*Praspedomyza*) *morio* (Brischke)
- G. trifidum L.: *Phytobia* (*Praspedomyza*) *morio* (Brischke)

Caprifoliaceae
- Lonicera involucrata (Rich.) Banks: *Phytagromyza loniceraе* (Robineau-Desvoidy), *Phytomyza gregaria* Frick
- Lonicera sp., cult. var.: *Phytomyza periclymeni* de Meijere
- Symphoricarpos albus (L.) Blake: *Phytagromyza loniceraе* (Robineau-Desvoidy), *P. orbitalis* (Melander), *Phytomyza periclymeni* de Meijere
- S. mollis Nutt.: *Phytagromyza orbitalis* (Melander)
- S. rotundifolius Gray: *Phytagromyza orbitalis* (Melander)
- Viburnum pubescens Pursh: *Phytobia* (*Calycomyza*) *flavinotum* Frick

Cucurbitaceae
- Cucumis melo L., cult. vars.: *Liriomyza pictella* (Thomson)

Compositae

Cichorieae
- Lactuca sativa L.: *Phytobia* (*Amauromyza*) *maculosa* (Malloch), *Liriomyza langei* Frick
- Lactuca scariola var. integrifolia (Bogenh.) G. Beck: *Phytomyza lactuca* Frost
- Picris echioides L.: *Phytomyza atricornis* Meigen
- Sonchus asper (L.) Hill: *Ophiomyia coniceps* (Malloch), *Phytomyza atricornis* Meigen
- S. oleraceus L.: *Phytomyza atricornis* Meigen
- Taraxacum kok-sghyz Rodin: *Phytomyza atricornis* Meigen
- T. officinale Weber: *Tylomyza nasuta* (Melander)

Eupatorieae
- Eupatorium odoratum L.: *Melanagromyza mallochi* (Hendel)
- E. purpureum L.: *Phytobia* (*Calycomyza*) *flavinotum* Frick

Astereae
- Aster chilensis Nees: *Phytobia* (*Calycomyza*) *humeralis* (von Roser), *P.* (*C.*) *promissa* Frick
- A. divaricatus L.: *Ophiomyia maura* (Meigen)
- A. laevis L.: *Phytobia* (*Nemorimyza*) *posticata* (Meigen)
- A. novae-angeliae L.: *Ophiomyia maura* (Meigen), *Phytobia* (*Nemorimyza*) *posticata* (Meigen)
- A. ramosissimus (T. & G.) Cronq.: *Ophiomyia maura* (Meigen), *Phytobia* (*Nemorimyza*) *posticata* (Meigen)
- A. undulatus L.: *Ophiomyia maura* (Meigen), *Phytobia* (*Nemorimyza*) *posticata* (Meigen)
- Aster spp., cult. vars.: *Phytobia* (*Amauromyza*) *maculosa* (Malloch), *P.* (*Calycomyza*) *humeralis* (von Roser), *Liriomyza langei* Frick, *L. pictella* (Thomson)
- Baccharis douglasii DC.: *Phytobia* (*Amauromyza*) *maculosa* (Malloch), *P.* (*Calycomyza*) *humeralis* (von Roser)
- Baccharis viminea DC.: *Phytobia* (*Calycomyza*) *jucunda* (Wulp)
- Erigeron canadensis L.: *Phytobia* (*Amauromyza*) *maculosa* (Malloch), *P.* (*Calycomyza*) *humeralis* (von Roser), *P.* (*C.*) *jucunda* (Wulp)
- Erigeron sp.: *Phytobia* (*Calycomyza*) *jucunda* (Wulp)
- Grindelia squarrosa (Pursh) Dunal: *Phytobia* (*Calycomyza*) *jucunda* (Wulp)

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Heterotheca grandiflora Nutt.: *Phytobia* (*Calycomyza*) *humeralis* (von Roser), *P.* (*C.*) *jucunda* (Wulp)

Solidago bicolor L.: *Phytobia* (*Nemorimyza*) *posticata* (Meigen)

S. caesia L.: *Ophiomyia maura* (Meigen), *Phytobia* (*Nemorimyza*) *posticata* (Meigen), *P.* (*Calycomyza*) *jucunda* (Wulp)

S. canadensis L.: *Ophiomyia maura* (Meigen), *Phytobia* (*Nemorimyza*) *posticata* (Meigen), *P.* (*Calycomyza*) *jucunda* (Wulp)

S. elongata Nutt.: *Phytobia* (*Nemorimyza*) *posticata* (Meigen), *Liriomyza eupatorii* (Kaltenbach)

S. flexicaulis L.: *Ophiomyia maura* (Meigen), *Phytobia* (*Nemorimyza*) *posticata* (Meigen), *P.* (*Calycomyza*) *jucunda* (Wulp)

S. juncea Ait.: *Ophiomyia maura* (Meigen), *Phytobia* (*Nemorimyza*) *posticata* (Meigen)

S. leiophylla Fern.: *Ophiomyia maura* (Meigen), *Phytobia* (*Nemorimyza*) *posticata* (Meigen)

S. macrophylla Pursh: *Phytobia* (*Calycomyza*) *humeralis* (von Roser)

S. nemoralis Ait.: *Phytobia* (*Nemorimyza*) *posticata* (Meigen)

Solidago spp.: *Phytobia* (*Calycomyza*) *solidaginis* (Kaltenbach)

Inuleae

Antennaria plantaginifolia (L.) Hook: *Phytomyza atricornis* Meigen

Gnaphalium leucocephalum Gray: *Phytomyza atricornis* Meigen

Heliantheae

Bidens frondosa L.: *Phytobia* (*Calycomyza*) *allecta* (Melander), *Phytomyza atricornis* Meigen

B. pilosa var. radiata Sch.: *Phytobia* (*Amauromyza*) *maculosa* (Malloch)

Dahlia pinnata Cav.: *Liriomyza pictella* (Thompson)

Encelia sp.: *Melanagromyza viridis* (Frost)

Helianthus annuus L.: *Phytobia* (*Amauromyza*) *maculosa* (Malloch), P. (*Calycomyza*) *humeralis* (von Roser), *P.* (*C.*) *jucunda* (Wulp) *Liriomyza pictella* (Thomson)

H. californicus DC.: *Phytomyza atricornis* Meigen

Helianthus spp.: *Phytobia* (*Calycomyza*) *allecta* (Melander)

Parthenium argentatum Gray: *Phytomyza atricornis* Meigen

Rudbeckia laciniata var. hortensis Bailey: *Phytobia* (*Calycomyza*) *allecta* (Melander), *P.* (*C.*) *artemisiae* (Kaltenbach)

Zinnia spp., cult. vars.: *Melanagromyza viridis* (Frost), *Phytobia* (*Calycomyza*) *humeralis* (von Roser), *P.* (*C.*) *jucunda* (Wulp), *Liriomyza pictella* (Thomson), *Phytomyza atricornis* Meigen

Madieae

Madia elegans Don.: *Phytobia* (*Calycomyza*) *humeralis* (von Roser)

Ambrosieae

Ambrosia artemisiifolia L.: *Phytobia* (*Calycomyza*) *ambrosiae* Frick, *Phytomyza atricornis* Meigen

A. trifida L.: *Phytobia* (*Calycomyza*) *ambrosiae* Frick, *P.* (*C.*) *jucunda* (Wulp)

Xanthium strumarium L.: *Phytobia* (*Calycomyza*) *jucunda* (Wulp)

Anthemideae

Achillea millefolium var. lanulosa Piper: *Napomyza lateralis* (Fallén)

Artemisia douglasiana Bess.: *Phytobia* (*Calycomyza*) *artemisiae* (Kaltenbach)

A. vulgaris L.: *Phytobia* (*Amauromyza*) *maculosa* (Malloch), *P.* (*Calycomyza*) *artemisiae* (Kaltenbach), *P.* (*C.*) *humeralis* (von Roser), *Phytomyza albiceps* Meigen, *P. atricornis* Meigen

Chrysanthemum frutescens L.: *Phytomyza atricornis* Meigen

C. indicum L.: *Phytobia* (*Amauromyza*) *maculosa* (Malloch), *Phytomyza atricornis* Meigen

C. leucanthemum L.: *Phytomyza atricornis* Meigen

C. morifolium Ramat.: *Phytomyza atricornis* Meigen

Chrysanthemum spp., cult. vars.: *Phytobia* (*Amauromyza*) *maculosa* (Malloch), *Phytomyza atricornis* Meigen

Matricaria sp., cult. var.: *Phytomyza atricornis* Meigen

Senecioneae

Petasites sp.: *Phytomyza atricornis* Meigen

Senecio cruentus DC.: *Phytomyza atricornis* Meigen

S. lugens var. exaltatus Gray: *Phytobia* (*Calycomyza*) *majuscula* Frick

S. mikanioides Otto: *Phytomyza atricornis* Meigen

Cynareae

Arctium lappa L.: *Phytobia* (*Amauromyza*) *maculosa* (Malloch), *P.* (*Calycomyza*) *flavinotum* Frick

Arctium spp.: *Phytobia* (*Calycomyza*) *jucunda* (Wulp)

Carduus pycnocephalus L.: *Phytomyza atricornis* Meigen

Cynara scolymus L.: *Phytobia* (*Calycomyza*) *jucunda* (Wulp), *Phytomyza atricornis* Meigen

Silybum marianum Gaertn.: *Phytomyza atricornis* Meigen

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Figures 1–170

FIGURES 1–20.—*Agromyza* and *Napomyza* species. The heads are shown in profile except where noted. The solid line equals 1 mm.

Fig. 1.—Section of wing base of *Agromyza ambigua* Fallén, showing the manner in which the subcosta and R_1 unite at the costa, greatly enlarged.

Fig. 2.—Section of wing base of *Napomyza lateralis* (Fallén), showing the manner in which the subcosta and R_1 end separately in the costa, greatly enlarged.

Fig. 3.—Head of *Agromyza ambigua* Fallén (holotype ♀ of *A. kincaidi* Malloch), dorsal upper-orbital and vertical setae missing.

Fig. 4.—Wing of *A. aristata* Malloch (holotype ♀ of *A. ulmi* Frost), one-half size.

Fig. 5.—Head of holotype ♀ of *A. aristata* Malloch.

Fig. 6.—Head of holotype ♂ of *A. barberi* Frick.

Fig. 7.—Head of holotype ♀ of *A. canadensis* Malloch.

Fig. 8.—Head of holotype ♀ of *A. currani* Frost, one-half size.

Fig. 9.—Head of holotype ♂ of *Agromyza frosti* Frick, dorsal upper-orbital and vertical setae broken off.

Fig. 10.—Head of *Agromyza inaequalis* Malloch (holotype ♂ of *Agromyza iridescens* Frost), one-half size.

Fig. 11.—Head of holotype ♀ of *Agromyza isolata* Malloch, dorsal upper-orbital and vertical setae missing.

Fig. 12.—Head of *Agromyza nigripes* Meigen (holotype ♀ of *Agromyza dubitata* Malloch).

Fig. 13.—Head of holotype ♀ of *Agromyza pallidiseta* Malloch.

Fig. 14.—Head of same, front view.

Fig. 15.—Head of *Agromyza spiraeae* Kaltenbach (holotype ♂ of *Agromyza fragariae* Malloch).

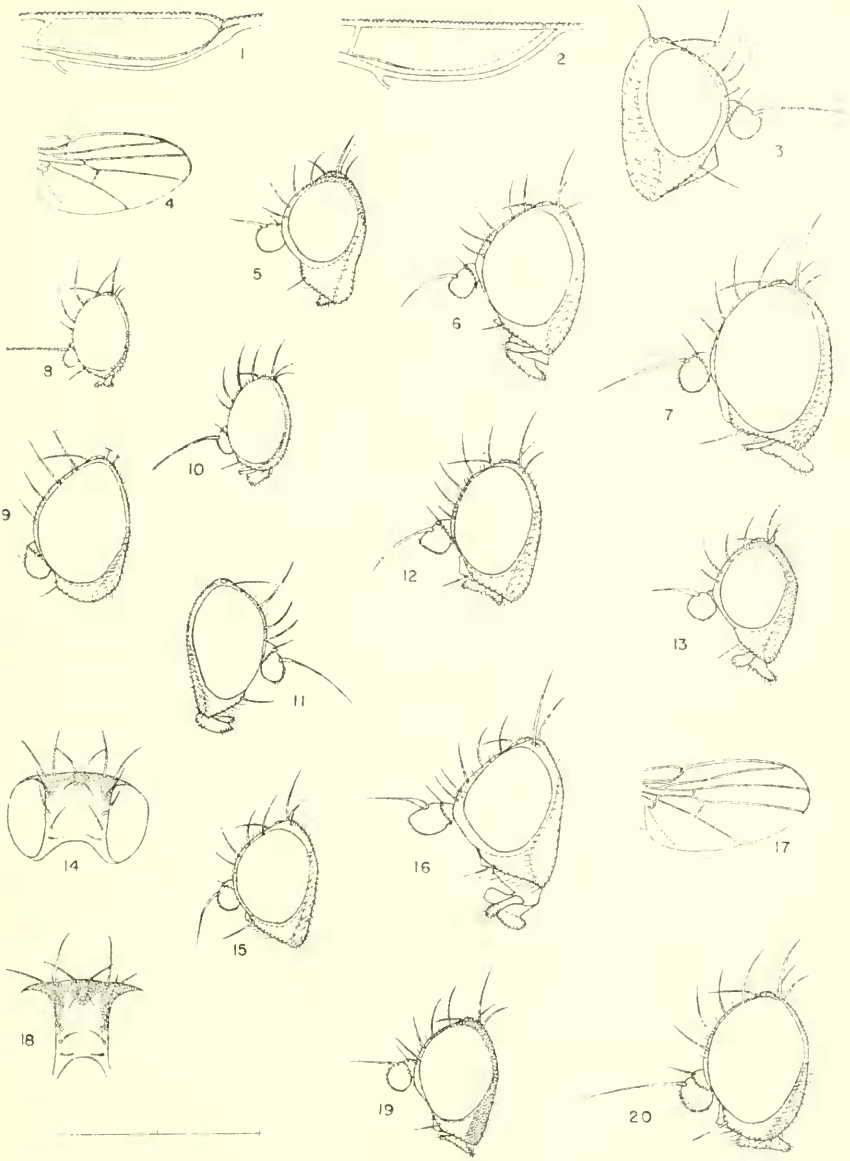
Fig. 16.—Head of *Agromyza subnigripes* Malloch (holotype ♀ of *Agromyza aprilina* Malloch).

Fig. 17.—Wing of holotype ♀ of *Agromyza varifrons* Coquillet, one-half size.

Fig. 18.—Head of same, front view.

Fig. 19.—Head of same, lateral view.

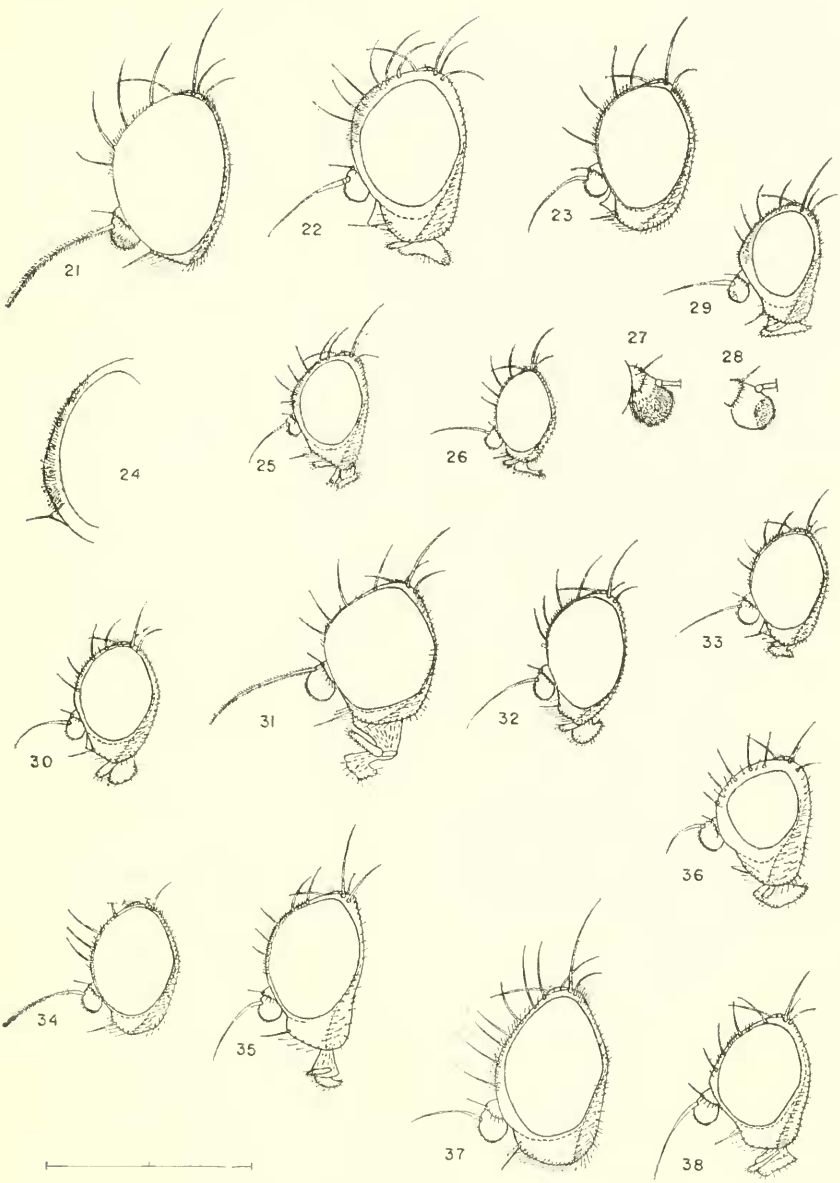
Fig. 20.—Head of holotype ♀ of *Agromyza viridula* Coquillett.



FIGURES 1–20.—*Agromyza* species and *Napomyza lateralis*. Explanation on facing page.

FIGURES 21–38.—*Melanagromyza* species. Heads are shown in profile. Solid line equals 1 mm.

Fig. 21.—Head of holotype ♂ of *Melanagromyza aldrichi* Frick.
Fig. 22.—Head of holotype ♂ of *M. angelicae* (Frost).
Fig. 23.—Head of holotype ♂ of *M. approximata* (Frost).
Fig. 24.—Portion of head of holotype ♀ of *M. burgessi* (Malloch).
Fig. 25.—Head of same, one-half size.
Fig. 26.—Head of holotype ♀ of *M. caerulea* (Malloch), one-half size.
Fig. 27.—Antenna of allotype ♂ of *M. dianthereae* (Malloch), greatly enlarged.
Fig. 28.—Antenna of holotype ♀ of same, greatly enlarged.
Fig. 29.—Head of same, one-half size.
Fig. 30.—Head of paratype ♀ of *M. gibsoni* (Malloch).
Fig. 31.—Head of holotype ♀ of *M. longiseta* (Malloch).
Fig. 32.—Head of holotype ♂ of *M. mallochi* (Hendel).
Fig. 33.—Head of holotype ♂ of *M. minima* (Malloch).
Fig. 34.—Head of holotype ♂ of *M. orbitalis* (Frost), dorsal upper-orbital, ocellar, and inner vertical setae broken off.
Fig. 35.—Head of holotype ♀ of *M. riparella* (Hendel).
Fig. 36.—Head of holotype ♂ of *M. salicis* (Malloch).
Fig. 37.—Head of holotype ♂ of *M. setifrons* (Melander).
Fig. 38.—Head of holotype ♂ of *M. similata* (Malloch).



FIGURES 21–38.—*Melanagromyza* species. Explanation on facing page.

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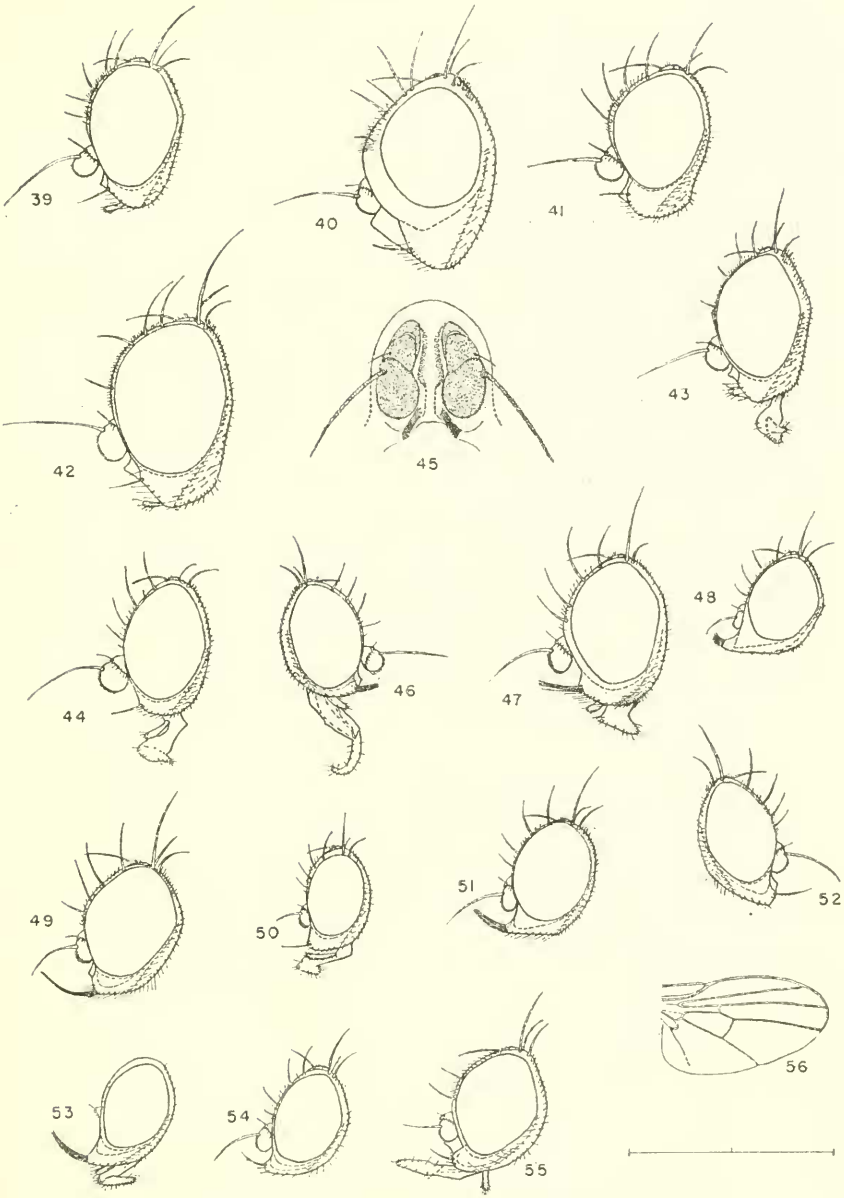
FIGURES 39–56.—*Melanagromyza*, *Ophiomyia*, and *Tylomyza* species. Heads are shown in profile except where noted. The solid line equals 1 mm.

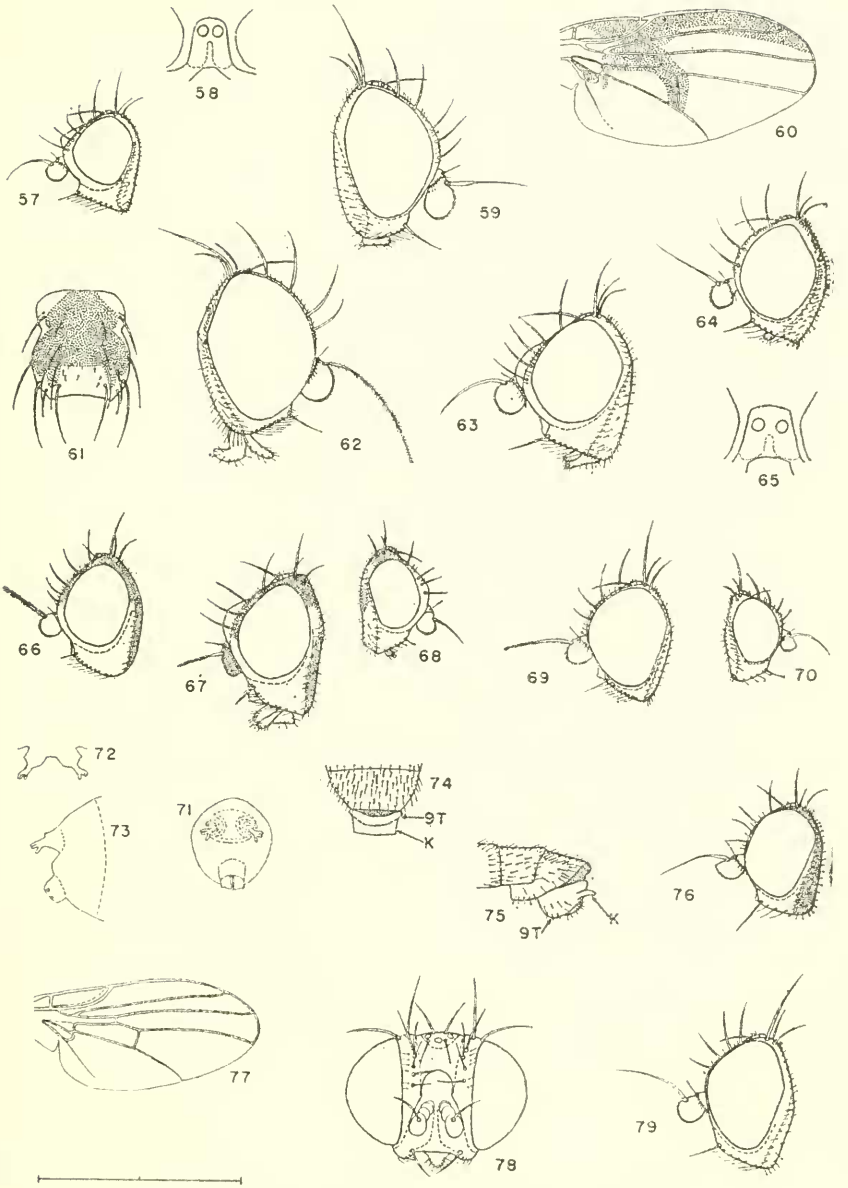
Fig. 39.—Head of holotype ♀ of *Melanagromyza subvirens* (Malloch).
Fig. 40.—Head of lectotype ♀ of *M. tamia* (Melander).
Fig. 41.—Head of paratype ♀ of *M. tiliae* (Couden).
Fig. 42.—Head of paratype ♀ of *M. virens* (Loew).
Fig. 43.—Head of holotype ♀ of *M. viridis* (Frost).
Fig. 44.—Head of holotype ♀ of *M. winnemanae* (Malloch).
Fig. 45.—Portion of head of *Ophiomyia maura* (Meigen) (♂, Germany, *ex Solidago virgaurea* L.), front view, greatly enlarged.
Fig. 46.—Head of holotype ♂ of *O. buscki* (Frost).
Fig. 47.—Head of holotype ♂ of *O. congregata* (Malloch).
Fig. 48.—Head of *O. coniceps* (Malloch) (♂, Laurel, Santa Cruz County, Calif.).
Fig. 49.—Head of holotype ♂ of *O. curvibrissata* (Frost).
Fig. 50.—Head of holotype ♀ of *O. insularis* (Malloch).
Fig. 51.—Head of *O. proboscidea* (Strobl) (♂, Germany, *ex Hieracium umbellatum* L.).
Fig. 52.—Head of holotype ♀ of *O. punctohalterata* (Frost).
Fig. 53.—Head of holotype ♂ of *O. texana* (Malloch), genovertical plates are not as in fig. 54 because the head could not be properly oriented, all setae missing.
Fig. 54.—Head of paratype ♀ of *O. texana* (Malloch).
Fig. 55.—Head of *Tylomyza nasuta* (Melander) (holotype ♂ of *Agromyza youngi* (Malloch)).
Fig. 56.—Wing of same, one-half size.



FIGURES 39–56.—*Melanagromyza*, *Ophiomyia*, and *Tylomyza* species.
Explanation on facing page.

FIGURES 57–79.—*Phytobia* species, heads shown in profile except where noted. The solid line equals 1 mm.

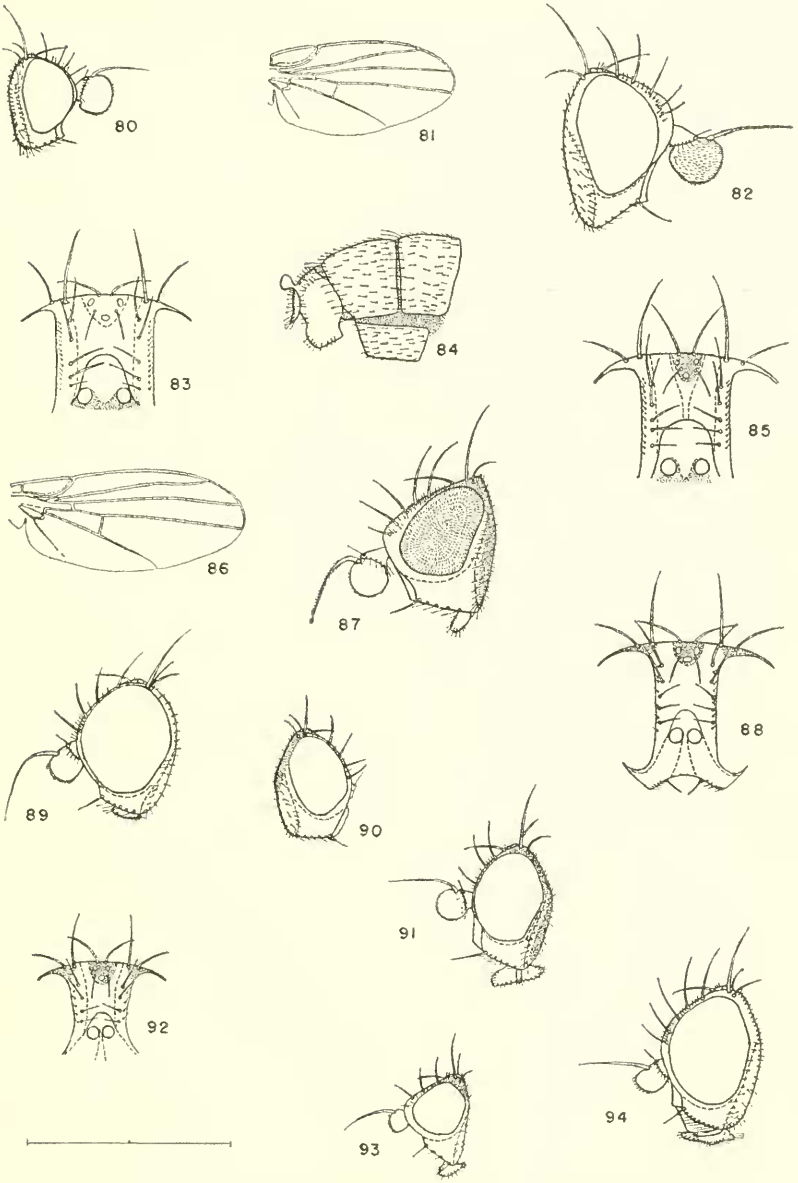
Fig. 57.—Head of holotype ♀ of *Phytobia* (*Phytobia*) *amelanchieris* (Greene), one-half size.
Fig. 58.—Mesofacial plate and lunule of same, full size.
Fig. 59.—Head of holotype ♂ of *P.* (*P.*) *indecora* (Malloch).
Fig. 60.—Wing of holotype ♂ of *P.* (*P.*) *kallima* (Frost), one-half size.
Fig. 61.—Mesonotum of holotype ♀ of *P.* (*P.*) *picta* (Coquillett), setulae on black not shown, one-half size.
Fig. 62.—Head of same, full size.
Fig. 63.—Head of holotype ♂ of *P.* (*P.*) *pruinosa* (Coquillett).
Fig. 64.—Head of *P.* (*P.*) *setosa* (Loew) (holotype ♀ of *Agromyza aceris* Greene), one-half size.
Fig. 65.—Mesofacial plate and lunule of same, full size.
Fig. 66.—Head of *P.* (*Cephalomyza*) *albidohalterata* (Malloch) (♂, White Heath, Ill.).
Fig. 67.—Head of lectotype ♀ of *P.* (*C.*) *auriceps* (Melander).
Fig. 68.—Head of holotype ♀ of *P.* (*C.*) *indecisa* (Malloch).
Fig. 69.—Head of *P.* (*Poëmyza*) *angulata* (Loew) (♂, Savanna, Illinois).
Fig. 70.—Head of holotype ♂ of *P.* (*P.*) *inconspicua* (Malloch).
Fig. 71.—Posterior end of puparium of same, spiracles above, anal opening below, posterior view.
Fig. 72.—Posterior spiracles of same, dorsal view.
Fig. 73.—Posterior end of same, lateral view.
Fig. 74.—Male terminalia of *P.* (*P.*) *lateralis* (Macquart) (paratype ♂ of *Agromyza coquilletti* Malloch), showing keel (K) of ninth tergite (9T).
Fig. 75.—Male terminalia of same, lateral view.
Fig. 76.—Head of *P.* (*P.*) *lateralis* (Macquart) (holotype ♀ of *Agromyza coquilletti* Malloch).
Fig. 77.—Wing of holotype ♂ of *P.* (*P.*) *subangulata* (Malloch), one-half size.
Fig. 78.—Head of same, front view.
Fig. 79.—Head of same, lateral view.



FIGURES 57–79.—*Phytobia* species. Explanation on facing page.

FIGURES 80–94.—*Phytobia* species. Heads are shown in profile except where noted. The solid line equals 1 mm.

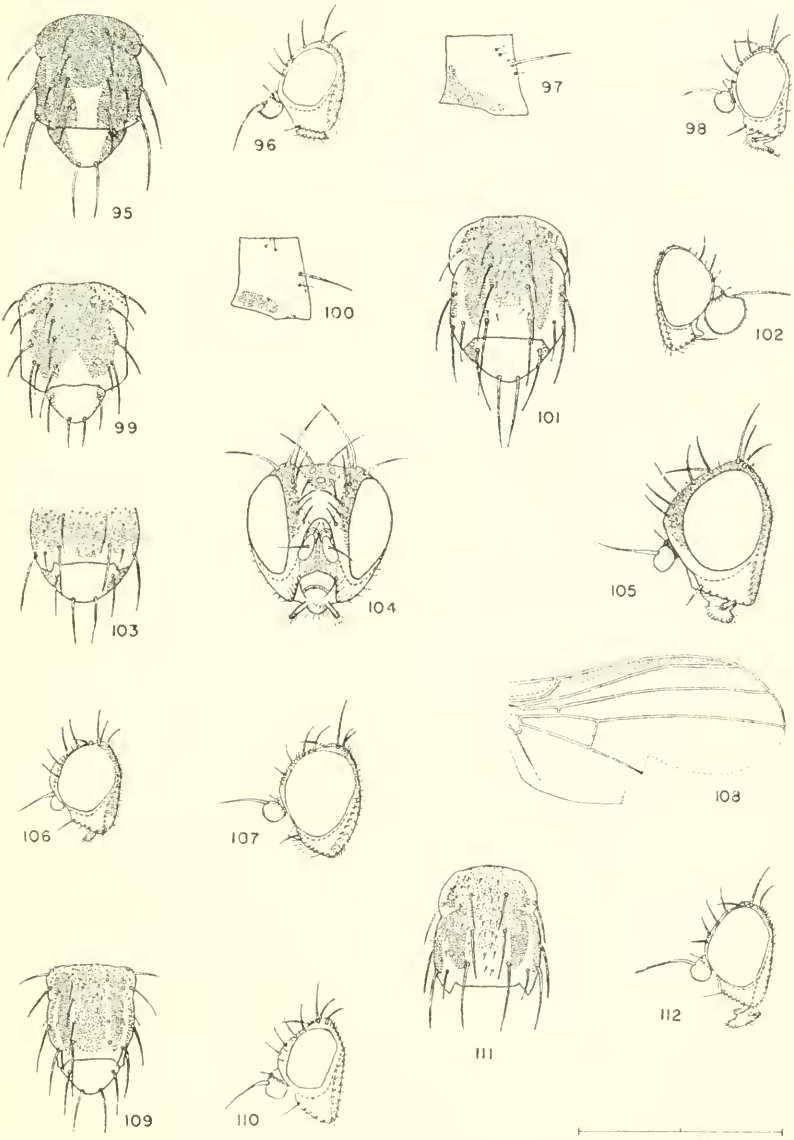
Fig. 80.—Head of holotype ♂ of *Phytobia* (*Dizygomyza*) *magnicornis* (Loew).
Fig. 81.—Wing of same, one-half size.
Fig. 82.—Head of lectotype ♂ of *P.* (*D.*) *thompsoni* Frick.
Fig. 83.—Head of same, front view.
Fig. 84.—Posterior end of abdomen and male terminalia of same, lateral view.
Fig. 85.—Head of *P.* (*Icteromyza*) *capitata* (Zetterstedt) (♂, Germany), front view.
Fig. 86.—Wing of holotype ♀ of *P.* (*I.*) *longipennis* (Loew), one-half size.
Fig. 87.—Head of lectotype ♂ of *P.* (*I.*) *pollinosa* (Melander).
Fig. 88.—Head of *P.* (*Trilobomyza*) *verbasci* (Bouché) (♂, Germany, *ex Scrophularia nodosa* L.), front view.
Fig. 89.—Head of holotype ♀ of *P.* (*T.*) *calyptrata* (Hendel).
Fig. 90.—Head of holotype ♀ of *P.* (*T.*) *pleuralis* (Malloch), third antennal segment missing.
Fig. 91.—Head of holotype ♀ of *P.* (*T.*) *varia* (Melander).
Fig. 92.—Head of *P.* (*Praspedomyza*) *approximata* (Hendel) (♀, Germany, *ex Daphne mezereum* L.), front view.
Fig. 93.—Head of *P.* (*P.*) *clara* (Melander) (♂, Mount Hermon, Santa Cruz County, Calif., *ex Pteridium aquilinum* (L.) Kuhn).
Fig. 94.—Head of holotype ♂ of *P.* (*P.*) *subinfumata* (Malloch).



FIGURES 80–94.—*Phytobia* species. Explanation on facing page.

FIGURES 95–112.—*Cerodontha* and *Liriomyza* species. Heads are shown in profile except where noted. The solid line equals 1 mm.

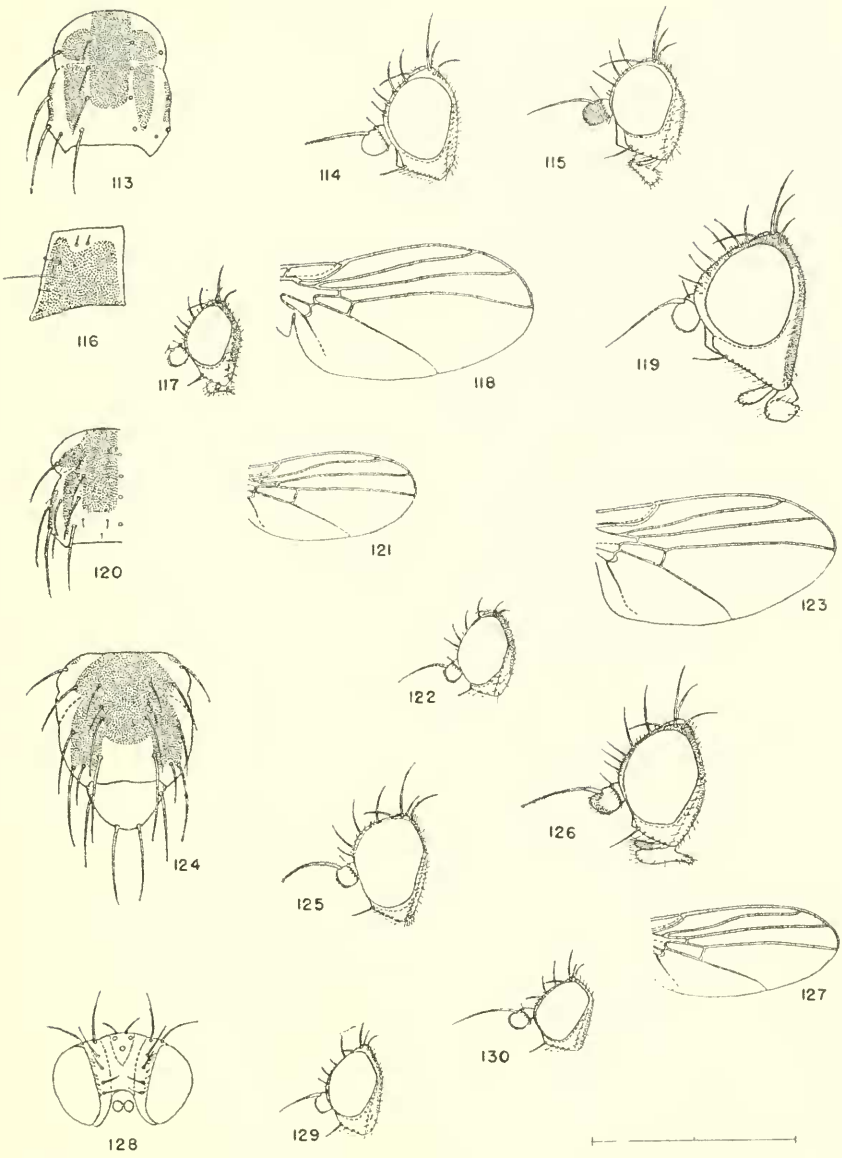
Fig. 95.—Mesonotum of holotype ♀ of *Cerodontha dorsalis* (Loew).
Fig. 96.—Head of holotype ♂ of *Liriomyza angulicornis* (Malloch).
Fig. 97.—Anepisternum of same, double size.
Fig. 98.—Head of holotype ♂ of *L. assimilis* (Malloch).
Fig. 99.—Mesonotum of same, right dorsocentrals omitted.
Fig. 100.—Anepisternum of same, double size.
Fig. 101.—Mesonotum of holotype ♀ of *L. borealis* (Malloch).
Fig. 102.—Head of holotype ♂ of *L. commelinae* (Frost), dorsal upper-orbital and both vertical setae missing.
Fig. 103.—Posterior half of mesonotum and scutellum of same.
Fig. 104.—Head of holotype ♀ of *L. deceptiva* (Malloch), front view.
Fig. 105.—Head of same, lateral view.
Fig. 106.—Head of holotype ♀ of *L. discalis* (Malloch).
Fig. 107.—Head of holotype ♂ of *L. felti* (Malloch).
Fig. 108.—Wing of holotype ♀ of *L. fumicosta* (Malloch), part of wing missing as shown.
Fig. 109.—Mesonotum of same, right dorsocentrals omitted.
Fig. 110.—Head of lectotype ♂ of *L. lima* (Melander).
Fig. 111.—Mesonotum of holotype ♂ of *L. marginalis* (Malloch).
Fig. 112.—Head of same.



FIGURES 95–112.—*Cerodontha* and *Liriomyza* species. Explanation on facing page.

FIGURES 113–130.—*Liriomyza*, *Metopomyza*, *Haplomyza*, and *Xyraeomyia* species. Heads are shown in profile except where noted. The solid line equals 1 mm.

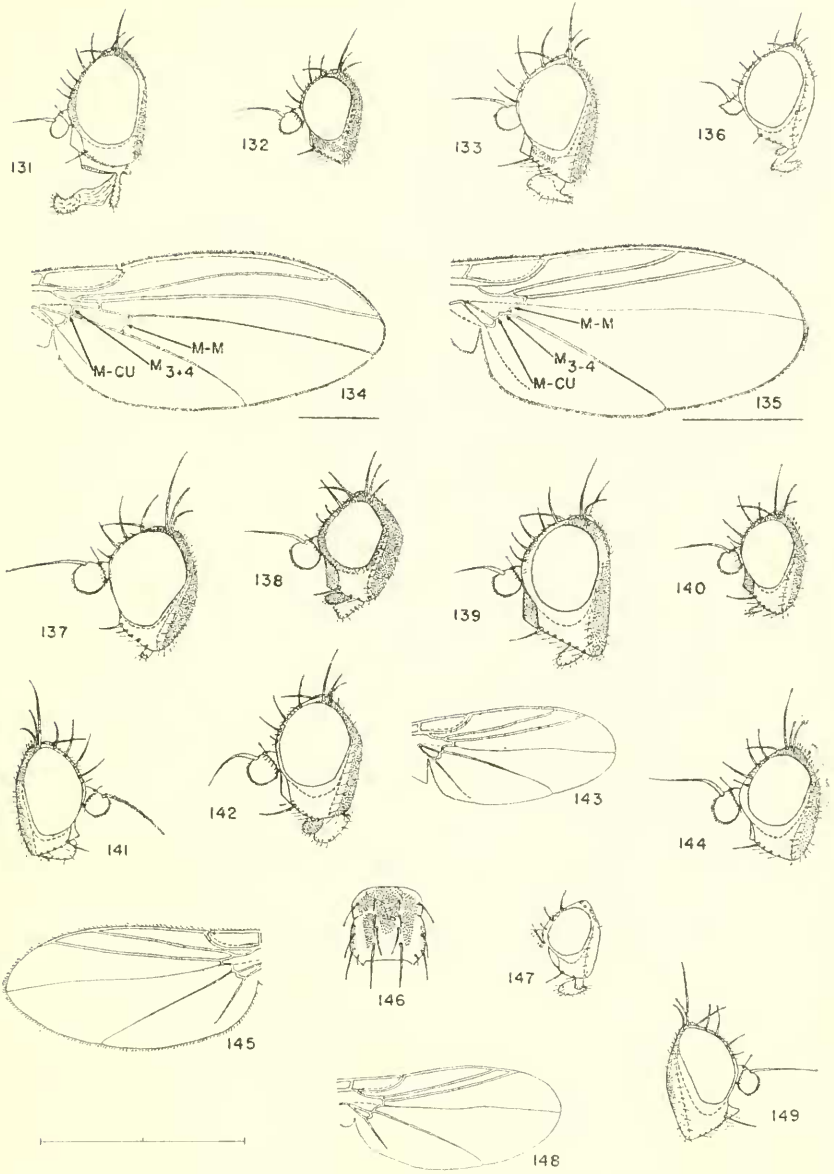
Fig. 113.—Mesonotum of lectotype ♀ of *Liromyza melampyga* (Loew), all setulae and setae on the right side omitted.
Fig. 114.—Head of *L. melampyga* (Loew) (♀, Glen Echo, Md.).
Fig. 115.—Head of lectotype ♂ of *L. pacifica* (Melander).
Fig. 116.—Anepisternum of holotype ♂ of *L. propepusilla* (Frost), double size.
Fig. 117.—Head of same.
Fig. 118.—Wing of same.
Fig. 119.—Head of holotype ♂ of *L. quadrisetosa* (Malloch).
Fig. 120.—Mesonotum of paratype ♀ of *L. reverberata* (Malloch), left half only.
Fig. 121.—Wing of same, one-half size.
Fig. 122.—Head of holotype ♂ of *L. schmidti* (Aldrich), inner vertical seta missing.
Fig. 123.—Wing of same.
Fig. 124.—Mesonotum of lectotype ♂ of *L. sorosis* (Williston), all setulae omitted.
Fig. 125.—Head of same.
Fig. 126.—Head of holotype ♀ of *L. variata* (Malloch).
Fig. 127.—Wing of same, one-half size.
Fig. 128.—Head of *Metopomyza interfrontalis* (Melander) (♀, Hope Valley, Alpine County, Calif.).
Fig. 129.—Head of *Haplomyza togata* (Melander) (♀, Bakersfield, Kern County, Calif., *ex Amaranthus hybridus* L.).
Fig. 130.—Head of paratype ♀ of *Xyraeomyia conjunctimontis* Frick.



FIGURES 113–130.—*Liriomyza, Metopomyza, Haplomyza,* and *Xyraeomyia* species.
Explanation on facing page.

FIGURES 131–149.—*Phytagromyza*, *Pseudonapomyza*, *Napomyza*, and *Phytomyza* species. Heads shown in profile. The solid line equals 1 mm. except where noted.

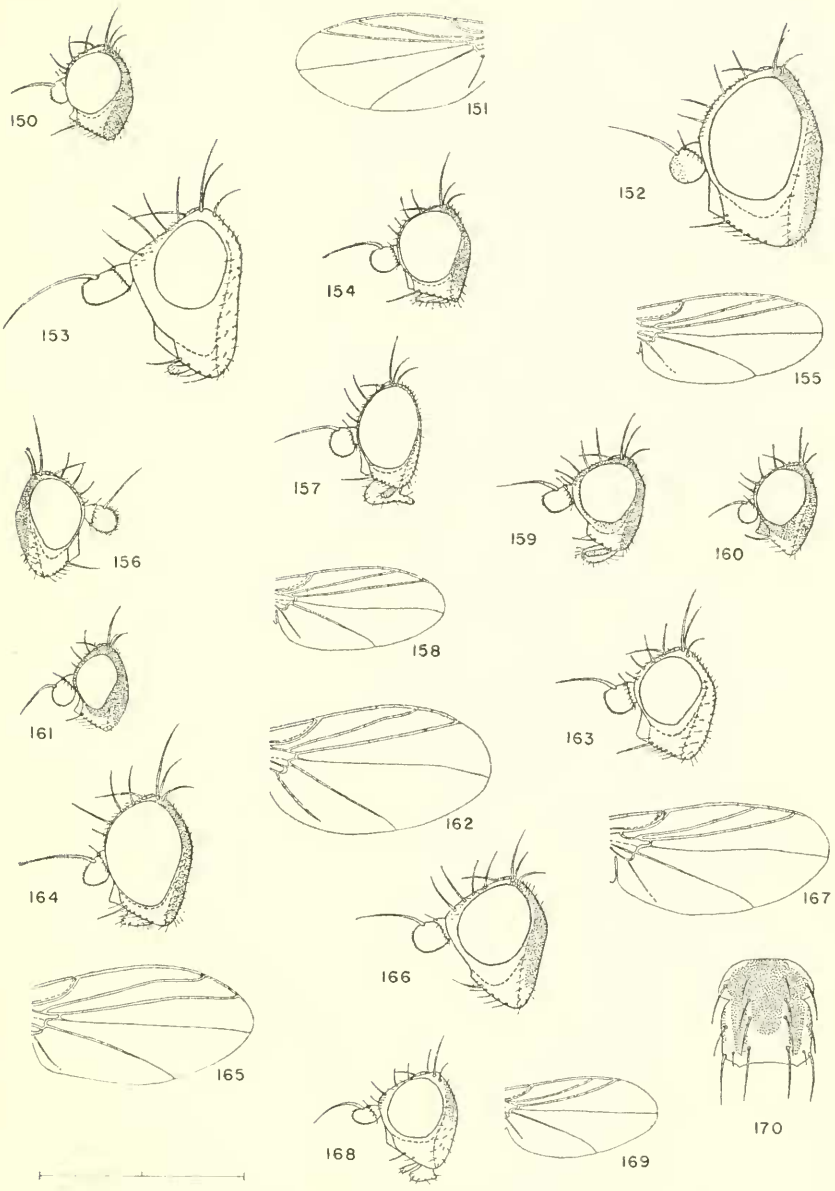
Fig. 131.—Head of *Phytagromyza nitida* (Malloch) (♂, White Heath, Ill.).
Fig. 132.—Head of lectotype ♂ of *P. orbitalis* (Melander).
Fig. 133.—Head of holotype ♂ of *P. plagiata* (Melander).
Fig. 134.—Wing of *P. flavocingulata* (Strobl) (♂, Germany), greatly enlarged, solid line equals 0.5 mm.
Fig. 135.—Wing of *Pseudonapomyza atra* (Meigen) (♂, Germany), greatly enlarged, solid line equals 0.5 mm.
Fig. 136.—Head of holotype ♀ of *P. lacteipennis* (Malloch).
Fig. 137.—Head of holotype ♀ of *Napomyza davisii* (Walton).
Fig. 138.—Head of holotype ♀ of *N. parvicella* (Coquillett).
Fig. 139.—Head of paratype ♂ of *Phytomza affinalis* Frost.
Fig. 140.—Head of holotype ♂ of *P. angelicella* Frost.
Fig. 141.—Head of holotype ♂ of *P. aquilegiana* Frost.
Fig. 142.—Head of holotype ♀ of *P. atripalpis* Aldrich.
Fig. 143.—Wing of same, one-half size.
Fig. 144.—Head of holotype ♀ of *P. auricornis* Frost.
Fig. 145.—Wing of holotype ♂ of *P. centralis* Frost.
Fig. 146.—Mesonotum of holotype ♂ of *P. clemativora* Coquillett.
Fig. 147.—Head of same, third antennal segment and both vertical setae missing.
Fig. 148.—Wing of same.
Fig. 149.—Head of holotype ♀ of *P. delphinii* Frost.



FIGURES 131–149.—*Phytagromyza*, *Pseudonapomyza*, *Napomyza*, and *Phytomyza* species. Explanation on facing page.

FIGURES 150–170.—*Phytomyza* species. Heads are shown in profile. The solid line equals 1 mm.

Fig. 150.—Head of holotype ♀ of *Phytomyza dura* Curran.
Fig. 151.—Wing of same, one-half size.
Fig. 152.—Head of holotype ♀ of *P. flavinervis* Frost.
Fig. 153.—Head of lectotype ♂ of *P. genalis* Melander.
Fig. 154.—Head of lectotype ♀ of *P. ilicicola* Loew.
Fig. 155.—Wing of same, one-half size.
Fig. 156.—Head of paratype ♂ of *P. lactuca* Frost.
Fig. 157.—Head of lectotype ♀ of *P. loewii* Hendel.
Fig. 158.—Wing of same, one-half size.
Fig. 159.—Head of holotype ♀ of *P. marginalis* Frost.
Fig. 160.—Head of holotype ♂ of *P. melanella* Frost.
Fig. 161.—Head of *P. minuscula* Goureau (lectotype ♂ of *P. nitida* Melander)
Fig. 162.—Wing of holotype ♀ of *P. nervosa* Loew, one-half size.
Fig. 163.—Head of holotype ♂ of *P. nigrinervis* Frost.
Fig. 164.—Head of paratype ♀ of *P. plumiseta* Frost.
Fig. 165.—Wing of same, one-half size.
Fig. 166.—Head of holotype ♀ of *P. subtenella* Frost.
Fig. 167.—Wing of same, one-half size.
Fig. 168.—Head of holotype ♂ of *P. trivittata* Frost.
Fig. 169.—Wing of same, one-half size.
Fig. 170.—Mesonotum of same.



FIGURES 150–170.—*Phytomyza* species. Explanation on facing page.

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